USINA
DE NOTÍCIAS

WIRTGEN GROUP
Close to our customers

EXCELLENCE IN PAVING

Applications, technologies and equipments for high quality paving

CHILE: infrastructure for growth

BRAZIL: comparative tests in compacting rollers that confirm performance and economy

PERU: speed to increase paved roads and highways

"NEW JERSEY" BARRIERS: agile execution with quality and less cost

Wirtgen · VÖGELE · HAMM · Kleemann · ciber

ROAD AND MINERAL TECHNOLOGIES

JUNE 2015
Number 31

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Luiz Marcelo Tegon, President of Ciber

Resilience, the ability that an individual or a population has to be able to adept or evolve positively face the situation after a moment of adversity.

This is the way we think that businesspeople, the industry, and the Brazilian people will have to behave constantly for the next few months, with extreme resilience. The current scenario of economics is notorious, just like our roadbuilding sector, which has been strongly impacted with a decrease in projects and construction works, in investments, delays, cost rise, and that have resulted in a lower demand in all sectors. It is the moment to continue to claim rights and growth for the country, and to seek a "positive agenda".

We need to look ahead, see what others do not see at times of difficulty, as many gurus have said. Seeking opportunities where we have not considered to get in before, adapting, and evolving. It is a fact that there have been delays of works, that there is an excessive delay to launch new projects, that the Brazil cost is increasingly more alarming. However, it is also a fact that many works continue ahead, that the newspapers everyday announced ongoing works everyday, new maintenance projects and broadening paving in hundreds of cities throughout the whole country. Moreover, the PPPs are more present in the media as a solution for large projects. Indeed, there are opportunities and new ones are created every day at a higher or lower speed, but they exist.

In previous editions of Usina de Notícias Magazine, we talked about compacting quality, asphalt mass production and soils and pavement recycling. In this edition, our focus is on Paving Excellence. The techniques, the recommendations, and best practices of a good application, tips from experts, advancements and innovations in terms of paving equipment, such as the technology and added systems that help and offer advantages and benefits to operators and businesspeople.

To be ahead in the market and aware of all opportunities means to be up to date with new techniques and applications, new resources and equipment, new technologies, and to overcome barriers. In means to resilient and innovator.

We wish you good businesses, enjoy your reading. ■

EXPEDIENT

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SEND INFORMATION ABOUT JOBS, WIRTGEN GROUP EQUIPMENT, CRITICISM AND SUGGESTIONS.

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Image: Vinícius Zimmer

TECHNOLOGIES THAT ENSURE SAFETY, QUALITY, AND ECONOMY

Comfort, agility, safety, performance, easy handling and efficiency are characteristics of luxury cars, but these attributes are not restricted only to those. Just like those vehicles, the equipment for construction and maintenance of roads, in addition to robustness, also add a lot of technology and are increasingly becoming friendlier.

This is due to the fact that the road machines, regardless the size of its functionality, goes through studies before going to construction works on roads. Technology is present in everything so then the machines help and facilitate increasingly more, the best way possible, the work of people.

Investing on this technological evolution is a main requirement to serve the demands of the market and the conditions demanded by the sector. Thinking about it, aiming at meeting the needs of its customers, new systems and applications present in the equipment are being improved, in a way to facilitate the use by the operators and maximize production, resulting in agility, economy, safety and convenience.

Still part of it are some of the latest technologies incorporated to milling machines, recyclers, pavers, compactors, and asphalt plants.

A paver that has the role to apply, level, and pre-compact the asphalt mix is one of the main machines in a road construction job and its quality is fundamental for the performance in the construction. For that, the systems of this equipment are developed to aid the operator's job, avoiding, therefore, that they make mistakes during paving.

The ErgoPlus system “trace 3” generation is one of them. It consists on a panel that improves the command system of the pavers. It has functions that facilitate interactivity of the work done by the operator with the machine, in addition to a panel of easy comprehension, because it has a universal graphic language, it can be used and “read” by all operators - regardless the country and the language.

In a paving operation, in addition to the main operator, there is also a professional that monitors the compacting screed. Some commands have been improved in a way to facilitate the execution and allow the screed operator to have access to a few commands that used to overload the operator. In addition, the leveling system is already included in ErgoPlus adding all necessary commands for a productive and high quality paving operation.

The ErgoPlus display, already in its third generation, provides better visibility and clarity. This way, keys with backlight are suitable for carrying out jobs in the evening, reinforcing the accuracy of command in the dark. For jobs during the day, the information displays are visible even under intense daylight.

With ErgoPlus 3, the operator can control the following systems: PaveDock Assistant – that increases the safety in the delivery of the material from the truck to the paver, making the communication between the truck driver and the machine operator more efficient; and Autoset Plus – that saves in its memory all the machine parameters allowing that, after closing and putting away the equipment, it can be reopened presenting the same parameters saved, by pushing only one button.

ERGOPLUS AT USE IN THE DUPLICATION OF BR-163

In Rondonópolis, Mato Grosso, the company Cavalca Construções e Mineração Ltda. operated in 22.7 kilometers of extension in the duplication of BR 163 (from km 94.9 to 117.6). This is one of the main roads that connects the state of Rio Grande do Sul to the state of Pará, cutting Brazil vertically, and that was built during the process of national integration (Processo de Integração Nacional), during the government of president Juscelino Kubitschek (1955 – 1960).

According to the engineer Dejanir Franch, responsible for Cavalca Construções job, which used a Super 1800-3 Paver by Vögele, the main advantages of ErgoPlus to be highlighted, noticed during operation, are the following “width accountability and plain layer, offering, thus, more safety of application from the operator and material savings due to width homogeneity”.

Still, according to Franch, the technology has led the company to acquire a paver. “The screed heating system (generator), the vibration system with tampers, and specially ErgoPlus, made me notice more correct actions than wrong ones”, he said.

Pictures: Ciber image files

ErgoPlus Panel, with symbols of easy understanding that, facilitate the command by the operator

LEVELING IN 3D COMMAND

Just like Vögele pavers, the Wirtgen SP 15 and SP 25 concrete pavers and the milling machine Wirtgen W200 also have a technology addition available to operators.

It consists of the leveling systems, available as standard, being a sensor of transversal inclination, two longitudinal direction sensors and an optional 3D set. These systems inform the machine about the direction they should go, as well as the thickness of the layer, variation of terrain slope, among other pieces of information.

With an advanced system of tridimensional command, the equipment has an automatic pilot and one economic unit of easy operation. In the case of SP 15 and 25, this technology allows for a completely automatic paving of high quality, even in narrow radius – of up to 600 mm – allowing for the program of the tracing to be done in situ.

With an integrated computer, both on the paver and on the milling machine, and with an intuitive command panel, the machine has two GPS receptors that communicate with another station located at the job site.

With a fast training, any professional, even with little experience, is able to operate without any issues; in addition, it also has a self-explanatory process. The shapes of the profiles, once programmed, can be recorded, and reactivated at any given moment.

MONITORING SYSTEM

The asphalt plants can also offer high-tech style applications. It consists of the Remote Monitoring System, available in the Ciber Plant UACF iNOVA, which enables the managers of the job to remotely monitor the plant’s operation, making it possible to access the history of production and consumption of inputs, among other functions. This monitoring system allows checking the plant’s operation in real time, 24-7, in any remote unit. The manager of the job is able to view the same screen as the operator, bringing the office closer to the job site. It is only necessary to have internet access because the company offers a program in which the owner of the plant can access the information in his computer. Ciber offers a system in which the customer downloads the program and, with it, having access to the internet, it is possible to monitor in real time the plant’s production, and check temperatures, production graphs, among other resources available.

Application Screen

In addition to the graphic view of the production, operation alarms and generation of maintenance warnings, the system exempts operators from constant production of reports regarding the equipment’s productivity.

HAMMTRONIC

Compacting rollers also present systems and applications that help and modernize the functions in a way to ensure an agile and efficient job.

It is the case of Hammtronic, the operational management system available in the Hamm Compactor 3520, controlled by a microprocessor, which allows the operator to execute other activities while the system connects, monitors, and controls all important functions of the equipment. In addition, by monitoring and regulating the core functions of the machine, Hammtronic avoids possible mistakes of the operator, as well as reduces fuel consumption.

The Hammtronic components are:

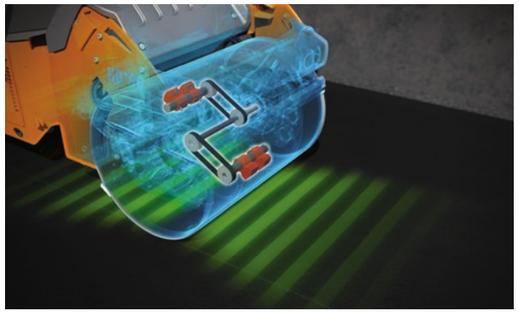
- Engine management – which adjusts automatically the engine speed, generating fuel savings, less noise and wear;
- Traction control – it controls the cylinder startup and tuning off, as well as maximum load, protecting the engine from overload;
- Anti-skidding control – it automatically detects conditions and operation data, uniformly distributing the force from the roller axis, resulting in excellent traction;
- Vibration control – it controls hydrostatic control, always compacting at the same, predefined frequency;
- View of information – the operator is informed in real time about all the functions of the equipment through the operation panel.

OSCILLATION

Patented technology, Hamm compactors have oscillating rollers that are cylinders developed by the company which oscillate in permanent contact with the layer, compacting at low impact, avoiding, therefore, eventual damage to the pavement, equipment, and to adjacent construction works.

This technique optimizes the work allowing a smaller amount of passes than with exclusively vibrating rollers. The use of two axis with eccentric weights that turn in opposite directions generates oscillating movements of the cylinder, that alternate front and backwards always in permanent contact with the ground. In addition, it has as an advantage the automatic regulation system of the amplitude; it adjusts to the hardness level of the material.

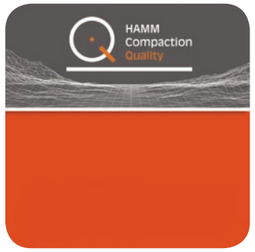
One of the technical advantages of the oscillating system is to obtain a higher degree of compaction with less passes. Combining the front vibrating cylinder with the oscillating rear cylinder, we obtain the highest degree of compaction with less passes. At places where it is not possible to use vibration, such as bridges and overpasses, we operate with the static front cylinder and the oscillating rear cylinder.



Oscillating cylinder

In the asphalt compaction sector, the oscillating technology reduces the impact on the surroundings, minimizing “side effects” of interventions in urban areas. This happens because the oscillation does a local action, concentrated, without generating vibrating shock waves to the surrounding area. This technology is appropriate, for example, for works on bridges and overpasses, on pavements with pipes and ducts buried close to the surface and close to fragile constructions.

COMPACTOMETER HCQ



The commitment with the development of new technologies for the production of machines and systems to allow that your customers obtain a high quality of compaction of soils and asphalt brings also the compactometer HCQ technology (Hamm Compaction Quality). It is suitable for the smooth roller soil compactors, such as the 3411, that detects the filling of voids on the soil, broadening the guarantee of service quality.

A sensor installed onto de cylinder reads the return of the vibrating impact along the soil. As the voids in the soil are filled and compaction is reached, there is a variation in the sensor reading. The operator receives a warning sign when the soil is close to its maximum density, with the voids already filled, avoiding over compaction and consequent material fragmentation.

The HCQ module offers an appropriate measurement and an evaluation system that adjusts to each application. For example, the HCQ modules help operators instantly, indicating where the required compaction has been reached, or when more passes are necessary.

Easy to use, the system is ready to start without any previous complex condition. The indication is shown on the operation panel of the roller in a clear way through oscillation of a pointer and through lighting of a warning light. ■

Images: Ciber image files

NEW ASPHALT PLANT CIBER UACF iNOVA

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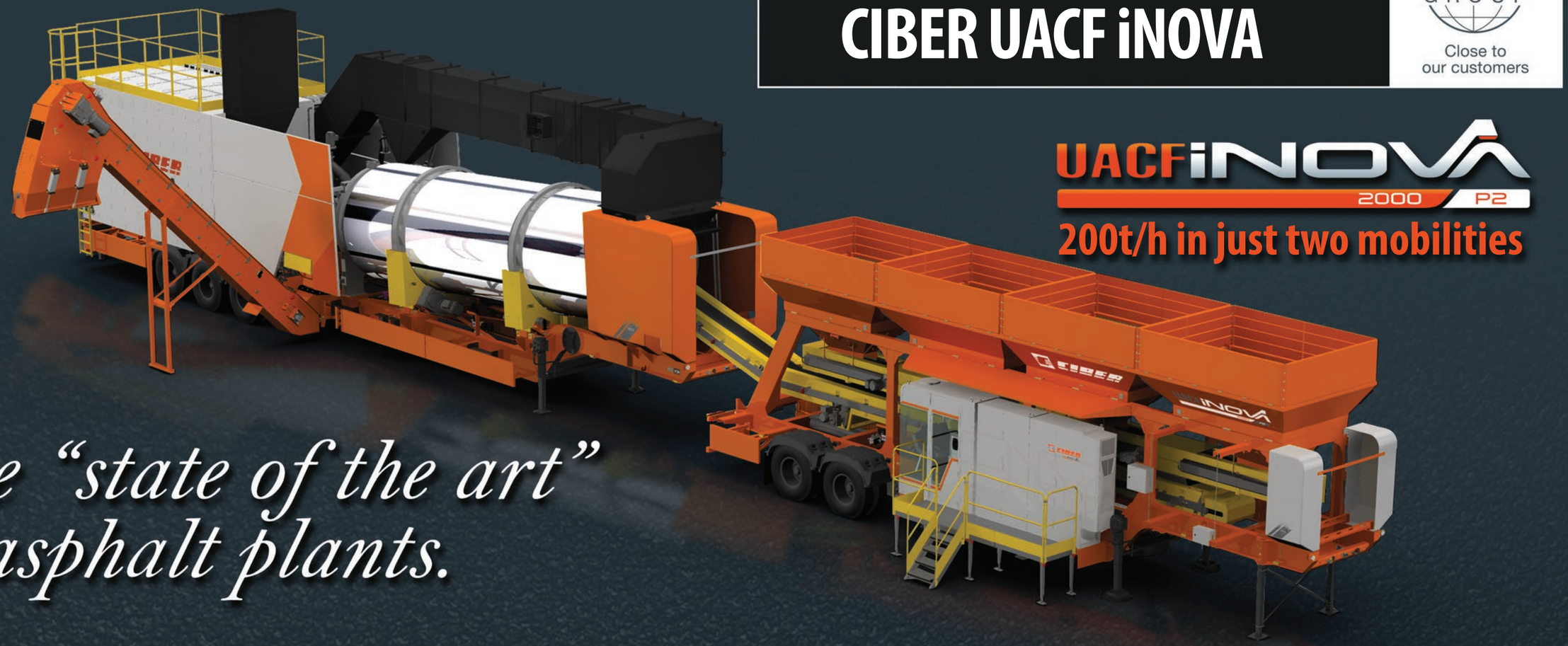


UACFiNOVA 2000 P2

200t/h in just two mobilities

The "state of the art" in asphalt plants.

200t/h in just two mobilities
High productivity and maximum mobility

Control of aggregates drying
Maximum thermal output

Total Air burner
A perfect and constant burn

External Mixer
Maximum technology in asphalt mix

Command central
200t/h in just two mobilities

Pictures: Bitumix CVV image files

CHILE: PAVING THE ROAD OF ECONOMIC GROWTH

CONSIDERED BY THE WORLD ECONOMIC FORUM AS THE MOST COMPETITIVE ECONOMY OF LATIN AMERICA, CHILE INVESTS IN INFRASTRUCTURE SO THAT IT DOES NOT BECOME A HINDRANCE

A country in Latin America that shows an optimistic perspective in the economy is Chile. It is a fact that the growth projections have already been better, but even so, the perspective of having a GDP increment from 2.5% to 3.5% for 2015 is not a reality for its continent neighbors. The Chilean performance is not a result of just a good moment. The Andes country has been receiving the results of the last 15 years, in which they have built an economy with a balanced performance, constant growth, inflation, and low interest, high investment rate and good conduction of public accounts. Unnoticed facing other countries in the continent, such as Brazil, Colombia, and Argentina, Chile has become known as a nation that mixed socialist public policy with liberal economy.

If Chile is now the apple in Latin America's eyes, the Chileans know that they cannot fall into the same mistakes other countries have had: hindering growth due to infrastructure. Chile has only a fourth of its almost 90 thousand kilometers of roads paved, a scenario that made the president Michelle Bachelet disclose in 2014 a package of public and private investments of almost 28 billion dollars in infrastructure projects for the next eight years.

The favorable moment Chile goes through generates opportunities for competent companies to help the government in this mission of improving infrastructure. In this scenario, one of the main players – if not the main one – is Bitumix CVV, which counts with a portfolio of more than 30 customers in the country. Among the main works is the route 160, carried out by Constructora Ruta 160 S.A., which has 88 km and connects the provinces of Arauco and Concepción.

Bitumix CVV was responsible for the works of the last 20 km (towards the South), for which they counted on technology and performance of an Advanced Ciber plant. "For the stretch mix projects were developed with 4.6% asphalt cement for the binder layer and the asphalt layer with 5.3% binding agent, says Rafael Dowling, general manager at Bitumix CVV.

The Advanced Ciber Plant has also taken part in the asphalt production for roads in the city of Concepción, second largest city in Chile. In the region, the plant may demonstrate its flexibility capacity for asphalt production with different mixes, meeting the needs and demands of works in the region, with a percentage of binder that vary from 5.3% to 3.9%.

In Concepción, the Ciber plant has produced asphalt for broadening Porto Coronel, which has the capacity for transportation of about 5 million tons per year; the extension on the airport runaway of Concepción Airport, in addition to several works on streets and avenues in the city.

For a company that acts in several works in distant places throughout the whole Chile, it is fundamental to work with a mobile asphalt plant.

"Before we used to work only with stationary plants and we felt that we needed mobility. When we started looking for it in the market, we found Ciber, which grabbed our attention because of the quality in production, technology and price. After acquiring it, we were even more satisfied with the after sales support that we got from Ciber, in addition to the Wirtgen Group, and from SALFA (dealer in the country) with which we had already a good relationship due to the machines we had before, says Dowling.

If Chile will reach its ambitious target of increasing paved roads, only time will tell. But one thing is certain: there will be no shortage of high quality asphalt. ■

Ciber plant in Valdívia

Picture: Ulisses Andrade

“NEW JERSEY” BARRIERS WITH HIGHER AGILITY AND LOWER COST

WITH A MUCH HIGHER PRODUCTION CAPACITY THAN THE TRADITIONAL METHOD, EQUIPMENT OPTIMIZES LABOR FORCE AND TIME

When we think about safety in highway traffic, one of the first measurements that come to the mind of an engineer is the installation of concrete barriers, also called New Jersey barriers, as a result they have the function to avoid that out of control vehicles cross the road because of an accident. This device has such an importance on the roads that the DNIT (Departamento Nacional de Infraestrutura de Transporte – National Department of Transport Infrastructure) has created rules establishing the conditions that should be met for the construction of safety barriers, such as the DNER-PRO 176/94 regulation.

However, when talking about roads, agility and efficacy are essential requirements. These are incompatible with the traditional method of producing those barriers, though, which is time consuming and little functional. The process consists of the construction of a wooden mold, where the concrete is poured and there is the need of waiting for it to dry, until the mold to be disassembled, and only then transported until the road where it is installed.

Seeking practicality and economy, Almaq Sant’Anna, a company of Sant’Anna Group, which acts on the segment of rentals of machines for asphalt and convoys for lubrication and supply, has acquired the concrete paver Wirtgen SP-25.

According to the commercial manager, Ulisses Andrade, the choice of this equipment was motivated by versatility and precision.

> “We opted right away to use the Wirtgen brand, for bringing us safety, better support, and intrinsic quality of the product. The choice for the SP-25 model came due to the quality, reliability and versatility that this equipment offers, working with concrete pavement, New Jersey barriers, and several types of special drainage works, in addition of being a productive piece of equipment of extreme precision in the execution of the project”, he explained.

Ulisses Andrade, commercial manager at Almaq Sant’Anna

This is because the molds should be coupled straight onto the machine, assembled on tracks, where the concrete is molded in the shape of the barrier through the equipment, which pours the material straight into the mold that adapts the dimensions through a vibration system, laying the material. As the machine moves, the mold moves along with it, producing approximately 1.5 meter per minute.

ON THE FIELD

Among the works in which Almaq Sant’Anna used the equipment, highlights for the production of triangle gutters, responsible for the drainage of the lane, in Porto Trombetas, Pará, and the New Jersey barriers on Raposo Tavares highway, in the countryside of the state of São Paulo, on the stretch that connects the cities of President Prudente and Presidente Epitácio.

The work, done by the construction company Construtora OAS S.A., started in September and was completed in December 2014. According to the commercial manager of Almaq Sant’Anna, it was done six times faster than using the traditional manufacturing method.

> “With our machine we can get up to 350 meters a day, with a team of seven people. If we were to produce this same amount per day with the traditional method, we would need, at least, 42 people. That is, six times faster using the SP-25”, he explains.

According to Ulisses, the first contact with SP-25 was in the end of 2012, the period in which they would start the project in Porto Trombetas. “We know the paver Wirtgen SP-25 in 2012. At that time, we had a contract that would demand a very high number of labor force with a very high cost, in addition to the risks that are intrinsic to this activity if we used labor force. The major issue was to execute the project in the shortest time and lowest cost possible. For this reason, we chose to buy the SP-25. It met our needs perfectly”, he adds.

TECHNICAL INFORMATION

Job: Corredor Raposo Tavares – Stretch II
Place: From Ourinhos - SP to Presidente Epitácio - SP
Length: 75 km + 7 km
Investment: Total value of the work (since 2009) R$ 1.8 billion*
Technique: Construction of safety barriers New Jersey
Start: September 2014
Completion: December 2014

** The 444 kilometers of Corredor Raposo Tavares are under the administration of the CART SINCE 2009, after the company won international competition done by the government of the state of São Paulo in the previous year.*

ECONOMY

Due to the high degree of automation and technology, there is no need for a heavy operational team when compared to other methods. With the conventional method, it is necessary the participation of 15 people, from manufacturing the mold to the laying process on the road. With the concrete paver, however, four professionals are enough, resulting in savings in labor force, reduction of material waste, reduction of execution time of the work, and efficiency in the process of production of the barriers.

In addition to the reduced team, the process of use requires one only pass, what provides agility and economy. This barrier concreting application using the concrete paver with mold allows increasing production in up to 10 times. In manual mode a maximum of 50 meters a day is done, whereas with the machine it is possible to make from 400 to 500 meters in only one day.

PAVERS DO NOT LIVE ONLY ON BARRIERS

However, concrete pavers do not live only on safety barriers. Due to the modular design, the range of applications increases, making it possible to use different patterns, producing, in addition to the curbs, safety barriers, water gutters, among other monolithic profiles, such as sidewalks, pavements, and rural roads.

Different from the model used by Almaq Sant'Anna, the offset paver SP-15 is a feasible option for the ones who want to produce protection barriers only. This is the machine with the smallest dimensions among the 12 models of concrete pavers available by Wirtgen, it runs on three tracks. Thanks to its compact size, it requires simpler transportation logistics.

More versatile, the inset paver SP-25 allows for a larger range of use. When positioning molds, both inside and outside the chassis, it paves sidewalks and roads, getting to a width of 3.50 meters and height of 400 mm. With a six cylinders diesel engine, it reaches a reach speed of 35 m/min. It also has three tracks (two in the back and one in the front), and it has four optional tracks. This way, the paver may be displaced always in the same direction as the traffic flow, avoiding risky moves of the mixer.

For leveling systems, available as standard, there is a sensor of transversal inclination, two longitudinal direction sensors and an optional 3D set. Another option is a height and direction probe for moving in narrow curves. ■

Picture: Ulisses Andrade

HD 90 HAMM ROLLERS NOW PRODUCED IN BRAZIL

The national market now counts on the HAMM HD90 model, which is produced starting in June at Ciber Equipamentos Rodoviários, a subsidiary of the Wirtgen Group, with the same quality and production standards of the equipment produced in Germany. The launching will happen during the M&T Expo 2015, in the month of June.

Among the main advantages of the Hamm HD 90, which is part of the 9 ton class, is the double smooth vibrating roller, that allows the use of a broad range of applications in asphalt compaction and in granular base layers. The equipment presents also total visibility of the drums (front and rear), allowing the operator to always keep these components clean through water spraying system and scrapers.

Hamm HD 90 also presents double vibration frequency and amplitude, which ensure effectiveness of compaction in different materials with different thickness; ergonomic rotary operation platform which allows to view the compaction edges in works along lateral obstacles, such as sidewalks; displacement of the rear drum in 10 cm to the side, allowing a safer job along edges and lateral obstacles, focusing solely on the front drum; and a three-point articulation, which allows compaction even on higher degree cross-inclinations.

In terms of maintenance, Hamm HD90 allows for cleaning inspection of spraying nozzles and replacement of the drum scrapers, making possible a uniform and flawless compaction. In addition, the Hamm cylinders of the entire HD series gather reliability and productivity in a precise way, ensuring a lower number of passes and economy in fuel consumption.

Check other differentials of the HD 90 Hamm Roller:

> Ergonomic seat, with two multifunctional drive levers.

> Driver's seat, including the steering wheel and instruments panel that can be turned and rotated.

> Diesel engine with high power and low noise level.

> Maximum operational weight: 11.840 kg.

> ISO 14396 power, kW/PS/rpm: 100.0/136.0/2300.

From now on, you will be able to acquire the HAMM HD90 compacting roller, produced in Brazil, with immediate availability of parts and highly trained technical specialists, and with FINAME. ■

EXCELLENCE IN PAVING

More than manufacturing and providing equipment, it is necessary to present technical solutions for each specific application. Currently, there is a large portfolio of products and complete technical solutions for a large range of applications in construction, maintenance, and rehabilitation of pavements, both in asphalt and in concrete.

At each constructive stage, the choice of the correct equipment ensures total productivity and quality of the construction job. Technological innovations add even more efficiency and safety to the execution, walking side by side with the new techniques of civil engineering, which are continuously developed to build and maintain roads in a faster way, with lower cost and higher quality.

HOW TRAFFIC INTENSITY INFLUENCES ROAD STRUCTURE

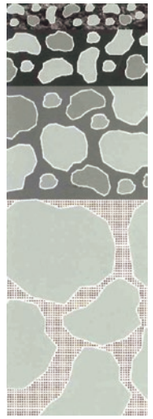
Example of an urban road built in asphalt

Roads that lead, for example, to regions of residential properties are used only by a few trucks and should deal with a relatively small number of cars. The portion of the pavement bound by binding agents has, therefore, a smaller thickness on these urban roads. An asphalt base layer with a thickness of up to 10 cm is built on a non-bound base of 45 cm. Above those higher asphalt layers a surface layer is laid which, in this case, has a thickness of 4 cm. Among other things, it is responsible for the quality of the road. The upper layer should meet several requirements: is should be wear resistant and highly stable, in addition of having a homogeneous surface texture resistant to skidding. The surface layer is the layer exposed to higher loads: it is directly affected by traffic, by weather and by other environmental factors.

Picture: Ciber image files

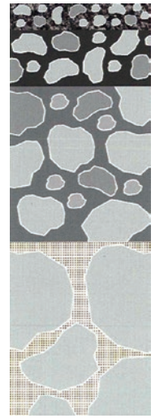
Example of a road built in asphalt

Roads between cities and municipalities or intense traffic roads are exposed to medium to high loads. Those connection roads are above 30 cm of non-bound base course and as asphalt base of 16 cm thickness. Above that, the pavement is stabilized by a binder layer of 8 cm of asphalt. The third layer is responsible for ensuring the shearing force of the pavement, which means that it should avoid that the pavement suffers shearing as a result of the vertical and dynamic forces generated by vehicles breaking and speeding. The pavement is completed by an asphalt surface layer of 4 cm.



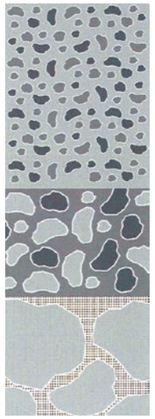
Example of a highway built in asphalt

Highways are generally exposed to extreme forces. Both the number of vehicles and the percentage of heavy traffic are permanent challenges. For this reason, the structure of the pavement should meet the highest demands, which are met through thicker base courses, a highly viscosity asphalt and mineral aggregates consisting of crushed stones. The asphalt base layer is 22 cm. The thickness of the binding layers and surface is identical to the one of roads.



Example of a highway built in concrete

Highways are the main application for this material in road construction. Differently from an asphalt road, a concrete pavement combines the functions of coating layer, binding layer and base layers – a fact that makes it resistant to plastic deformation. Concrete highways consist of an 18 cm base layer, a 15 cm cement treated base, and a 26 cm concrete layer.



PROJECT AND DIMENSIONING OF PAVEMENT STRUCTURE

The function of the pavement is to resist to the loads imposed by traffic, in a way to ensure safety and comfort to the road users. For that, the first step is to study the local traffic, both in relation to the volume and to the weight of the vehicles. Because, for example, a 30 ton vehicle does not apply the same load as 30 vehicles of one ton, but a higher intensity. Thus, the more detailed the research about the traffic volume of the future road is, the better the dimensioning of the structure.

The study of the soil regarding its origin and conditions is fundamental for the correct attributions, because certain types that present low capacity to resist the vertical efforts or the low resilience module need reinforcements that may be achieved through physical or chemical stabilization, either with the use of binding agents, such as lime and cement, or even the bitumen emulsion or foam. For soils with better characteristics, it is enough to be compacted.

All roads have in common the division of its structure into several granular layers. Each layer has mineral aggregates in different sizes, according to the required characteristics. In general, the layers closer to the surface have finer aggregates in relation to the ones farther from it. On the base, right below the asphalt or concrete layer, higher particle size aggregates ensure the support and stability capacity. On the other hand, the elastic capacity of the layer does not improve, necessarily, with the increase of the stiffness. Estimated traffic will guide the structuring and thickness of such layers.

Bound and non-bound base layers make the foundation

Every road should be able to bear the traffic load in all climate conditions. A base layer consisting of crushed stone or sand with different granular sizes is laid on compacted or stabilized soil. This layer on the bottom of the upper structure or the road is generally built in non-bound material. The rock, called mineral aggregate, comes, generally, from quarries located on the surroundings of the job site. Natural rocks are called non-crushed aggregates. A mineral aggregate mechanically crushed consisting of crushed stone, chips, and crushed sand is used, many times, to improve the bearing capacity.

Roads are exposed to exceptional tensions in regions with frosting/ defrosting cycles. Existing water or water that gets in can lead to damage due to frost that, sooner or later, also show on the surface too. For this reason, an antifreeze layer should be laid on the soil, in regions where there are such climate influences. Because those materials have a number of essential properties, a graded aggregated of crushed stones or gravel is used for this purpose all over the world. Protection against antifreeze and water entrance is ensured by the high volumes of voids that drain the water. The highest the interlocking of the aggregate, the higher the stiffness of the layer. If specified, the non-bound layer is then followed by a bound layer. The binding agents used for this purpose are mainly the ones that have an important role on the following layers: asphalt or cement. Typical of a bound base layer is the mineral aggregate with a relatively high percentage of crushed grains.

Base layer bound with asphalt or cement

Mixes containing asphalt as binding agent are described as asphalt base layer materials disposed hot or cold, depending whether a hot or cold mix is used for the base. Hot milled bitumen base layers consist of crushed or non-crushed mineral aggregate well graded and asphalt according to the necessary properties.

If the aggregate is treated with cement, the resulting base is said as hydraulically bound. Those types of base layer are the ones called “stiff”. They are used, sometimes, as basis for the asphalt layers, but in its majority, for concrete pavements. The mineral aggregate used for such layers includes non-crushed gravel or crushed stones, chips and crushed and natural sand. Increasingly, hydraulically bound basis also include recycled constructions materials, such as grain or crushed asphalt and reprocessed old concrete.

DEFINITION OF THE ASPHALT MIX FORMULA

As well as the definition of the pavement structure, the asphalt mix formula needs to take into consideration the volume and the intensity of traffic in the future road. Normally, the contracting organs have technical specifications that guide the projects constructions from the work ranges for each type of mix. This way, the project of an asphalt mix is developed from the construction of a grain size curve (relationship between the size of the aggregate and the percentage that goes through pre-stablished sieves) and the definition of the percentage of asphalt cement, according to the volumetric requirements of the mix. The formulas, of one or more projects, are saved in the plant’s memory and are used according to production needs.

Research and tests with modified asphalts, physically or chemically, add even more quality to pavement. Among the most used ones, highlights for the use of rubber asphalt and polymer asphalt which increase the pavement’s flexibility in the service conditions and tend to increase the useful life of the coating. New research aiming at lower the machining and compaction temperatures, known as warm mixes, tend to reduce asphalt material aging during plant manufacturing, and also present benefit to the pavement in the long term.

Currently, the introduction of milled material – known as RAP (Reclaimed Asphalt Pavement) – has been increasingly higher in asphalt mixes. Those recycled mixes are changing from the evolution in the projects techniques and use of new materials and with technological advancement of asphalt plants.

Picture: Ciber image files

Grain size separation in thick and fine RAP

ASPHALT MIX MACHINING

Roads in asphalt pavement are broadly used all over the world. Asphalt concrete is made in hot production and presents features that are adjustable to any type of topography, climate and traffic volume. The mix between mineral aggregates and the Petroleum Asphalt Concrete - PAC - produces a cohesive material, stable, with good vertical bearing capacity and high flexibility.

This is due to the fact that the asphalt is a mix of aggregates with bitumen binder, in general in which the asphalt concrete formula contemplates approximately 95% of aggregates and 5% PAC being that the last one varies, mainly, due to the amount of fine aggregates in the mix and the volume of voids required by the project. The aggregates contribute, mainly, with mechanical resistance and with vertical efforts, whereas the bitumen binder provides stability of the mix, ensuring flexibility, durability, and sealing of the coating course. With Asphalt Concrete materials heating is necessary to achieve adhesiveness between materials (capacity of the PAC to stick to the aggregates surface) and necessary workability for the compaction of the mix on the job.

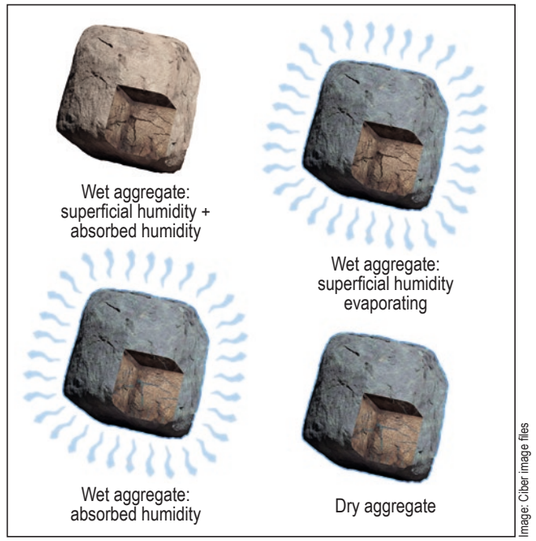


Image: Ciber image files

The asphalt plant produces the mix according to the formulation. For each application a specific type of asphalt mix may be required. For example, in a residential area of low traffic a mix of a higher amount of natural sand could be applied. On a heavy traffic road, on the other hand, there should be a higher percentage of crushed aggregates that supply a higher intertwining of the petrous structure and, as a consequence, a higher support capacity for the mix.

The production of the Asphalt Concrete in plant happens in three main stages. They are: dosing of aggregates and PAC; drying of aggregates and mix with the binding agent. All these stages are important to obtain a homogeneous asphalt mix with quality and on

Picture: Ciber image files

the correct temperature. A fourth stage, filtering gases, is important to retain the contaminating pollutants and keep the production constant, without interruptions.

The current equipment presents a high flexibility of applications, being able to adapt to the production of modified asphalt and special mixes, such as the SMA, which demands the use of fibers and an area for the dry mix of aggregates, among others.

SOIL TYPES AND COMPACTION

Nature does not provide always the best conditions for the construction of a road, which would have the shape of a massive natural rock. In most cases, the soil is loose and with low support capacity of loads. Consequently, the construction of a road starts with earthwork and compaction, which is the most important stage in the work of soil displacement. Its function is to reduce the internal voids of the soil, which are filled with water and air. Thus, the soil acquires the ideal density to resist the future loads imposed by traffic.

Each soil has different properties, however, two main soil groups have been established according to their batch size characteristics: cohesive soils and non-cohesive soils. In cohesive soils, such as clay and silt, over 35% of particles are passing in the 200 sieve with a 0.075 mm mesh. Those extremely small materials have the property to agglutinate, adhering to other particles as a means to retain humidity. The granular soils present a higher material size and do not stick, they are freely placed one beside the other allowing water permeability.

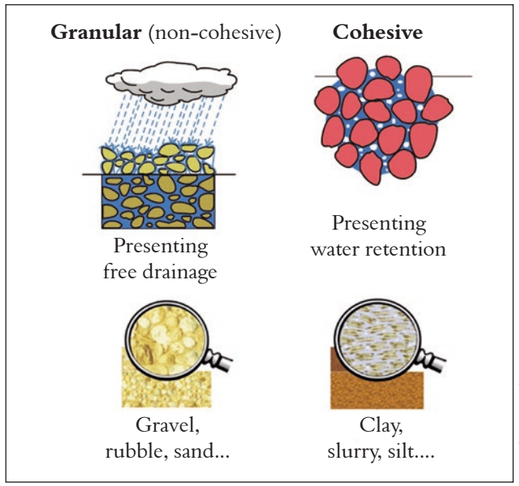
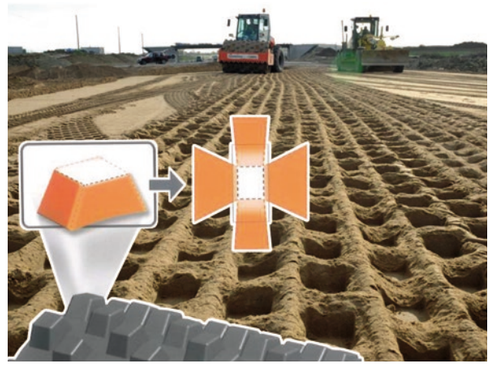


Image: Ciber image files

The highest trapezoidal pad area in the market ensures optimization of compaction with a larger area of contact with the soil



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VIBRATION ENSURES A DEEPER IMPACT

Soil compaction is more effective with the use of vibration, through eccentric weights turning at high speed inside the drum. Combination of vibration with the weight of equipment ensures that the strength transmitted to the soil is higher than the operational weight of the roller.

The intensity of vibration effect is influenced by three factors: the height of the drum reached during vibrating mode (called amplitude), the frequency of the strokes on the soil per second (called frequency) and the speed of execution, in addition to the time of execution of the whole job. With correct configurations, the required density per project can be reached with a lower number of passes.

Cohesive soils need a padfoot drum with a larger contact area and to reach deeply the layer, combined with higher vibration amplitude. For non-cohesive granular soils, it is enough to have a smooth cylinder and low vibration amplitude. With next generation rollers, it is possible to increase and decrease vibration frequency and amplitude, adapting to the job site conditions.

SOIL STABILIZATION WITH LOW SUPPORT CAPACITY

In some regions, the soil could have extremely problematic conditions, with a cohesive and humid composition, such as, for example, slurry. This type of soil cannot be compacted in a conventional manner. It is necessary, first of all, stabilize it removing the excessive humidity and improving its capacity of support for the following layers.

Stabilization is a method to improve those properties, mainly through the addition of lime or cement, or the combination of both, such as binding agents, and the use of a stabilizer and a recycler.

A Wirtgen recycler working on homogenization

Picture: Ciber image files

STRUCTURAL LAYERS OF PAVEMENT

All roads should resist the efforts coming from traffic under any meteorological condition. The pavement structure has to bear those forces and also resist the action of water. The first layer above natural soil is formed by rocks of a larger batch size. Those materials are loose and should be compacted in a way they lock themselves to one another. The second layer, on the other hand, presents a more reduced batch size and may present a connection through the use of a binding agent or agglutinating, such as cement or bitumen emulsion. For being closer to the wearing course, this connection between the materials, in a way to not be loose, it is important to bear the efforts coming from traffic.

Those structuring layers present an amount of water, known as the "optimum content", which results in a higher density of the mix. Compaction should happen when the material has an excellent level of humidity, avoiding water flow between the layers, that present different percentages of water.

Mineral aggregates are provided by quarries near the job site. The use of mobile crushers ensures a higher flexibility within the deposit, reducing the production costs and ensuring the continuous supply of input. A cold pre-mixing plant, also known as soils plant, mixes the different mineral aggregates and may reinforce them with the agglutinating agents. The material is then transported by truck to the site, where its application on layers is done, in general, with the use of graders, but it can also be applied with tracked pavers.

This way, the granular layer is more homogeneous, with regular edges, levelling and with pre-compaction of material, besides a higher speed of execution of this step.

Paver applying a granular base

Picture: Ciber image files

TWO DRIVE AND TRACTION CONCEPTS: WHEELS OR TRACKS

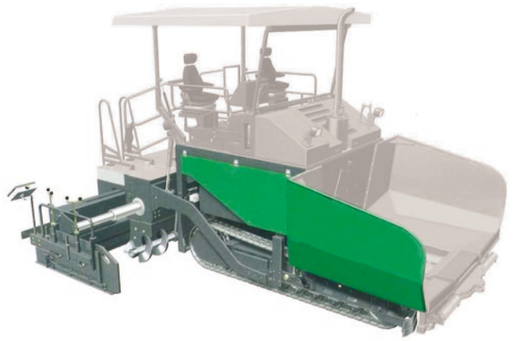
The Vögele pavers are offered with two optional drive and traction systems: on wheels or on tracks. Each system has its own distinctive advantages.

Paver on tracks

Tracks help the paver transfer the power from its high performance engine into the soil.

Different from wheels, the tracks have a larger surface contact with the soil, allowing reaching a higher traction effort. With pavers on tracks, the power is generated where it is needed: as direct power on the sprockets.

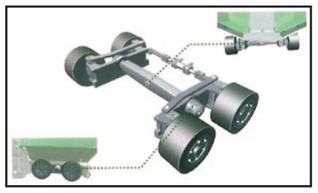
This powerful traction system allows the paver to operate even in difficult terrain or in large paving widths of up to 16 meters. Both tracks are electronically controlled



for this purpose. The pavers on tracks can also move in curved radius at constant paving speeds.

Pavers on wheels

An extremely smooth operation is necessary to build high quality asphalt pavements. The pavers on wheels translate the traction consistently in constant movement. For that, both rear wheels are individually powered. All models, as Vögele example, have an optional drive for front wheels. In the core of this smart traction concept is the so called "Traction Management" system (or TM). In combination with a differential electronic lock, it ensures the ideal distribution of the traction power to separate lines, resulting in high tracking accuracy. The paving speed is maintained even in curves, a fact that ensures that the pavement will follow the line and level throughout the whole paving width.



With its oscillatory suspension on the longitudinal and transversal directions, the wheel may pass over irregularities without the machine losing contact with the soil. Thus, maximum traction effort is ensured.

ADVANTAGES OF THE TWO TRACTION CONCEPTS

Paver on tracks:

> High traction effort.
> They can easily push heavy load trucks.
> They can operate on smooth soil.
> They can operate in large working widths.
> Universally suitable.

Pavers on wheels:

> They move on their own force in speeds of up to 20 km/h even on public roads;
> Ideal for quick and frequent job sites changes;
> Extremely simple operation in asphalt pavements;
> Highly maneuverable;
> The wheels are in permanent contact with the soil thanks to the oscillating axles.

PAVING EXECUTION AND LEVELLING

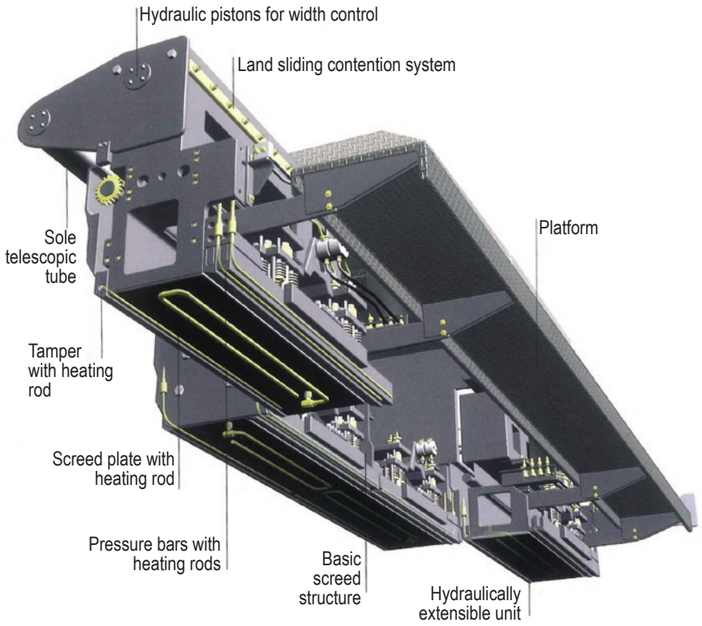
The step of great importance in the final quality of the paving process is the correct operation of the asphalt paver. First it is checked whether the base is clean and if the asphalt emulsion, used to agglutinate the mix with the granular layer below it, is applied homogeneously. The supply logistics must be well planned in a way to allow non-stop paving, with the lowest number of stops of the machine.

The commands of current pavers were planned in a way to avoid operation errors that may result in material segregation and application irregularities. There should be constant feeding of asphalt material, from the feed bin from trucks up to the compaction screed. Intuitive drives, informative display, and unobstructed view are features of the pavers, allowing for an efficient flawless work.

SCREED TECHNOLOGY

The screed is really the heart of the paving system. It houses the compaction systems that supply results of high compaction and durability.

Extensible screeds



Extensible screeds are ideal for all operations that require variability and flexibility. That includes, for example, stretches with varied paving widths, or when the paver should be repositioned many times and pave in different widths. The different types of extensible screeds cover a work range from 1.1 to 9 m and are available with systems for standard or high compaction.

The hydraulically variable units of all extensible screeds are extended and retracted through a sole telescopic tube. Half of the internal tube remains fixed, even when the screed is extended in its maximum working width. This way, the telescopic tube may ensure enough stability of the screed. The screed width is automatically adjusted, without the need of pulling it, through two hydraulic pistons of precise operation.

Fixed width screeds

Fixed width screeds have their own performance as necessary: when paving according to the alignment and the level throughout the whole width of a highway or when compacting high quality construction materials. With its modular design, fixed width screeds may be extended to the desired paving width up to 16 m through screwed in extensions. The screed can be built with screwed in fixed and hydraulic extensions.

Fixed width screeds are made available both with standard compaction systems (tamper and vibrator) and with high compaction systems (1 or 2 pressure bars).

The “floating screed” concept

A simple principle for completely flat paving: the screed is connected to the paver through two lateral and floating arms in the mix. That allows that any small irregularity on the basis can be compensated in the ration of 1:5, as long as the screed retains its position and is not lifted by the paver.

Electric heating of the screed

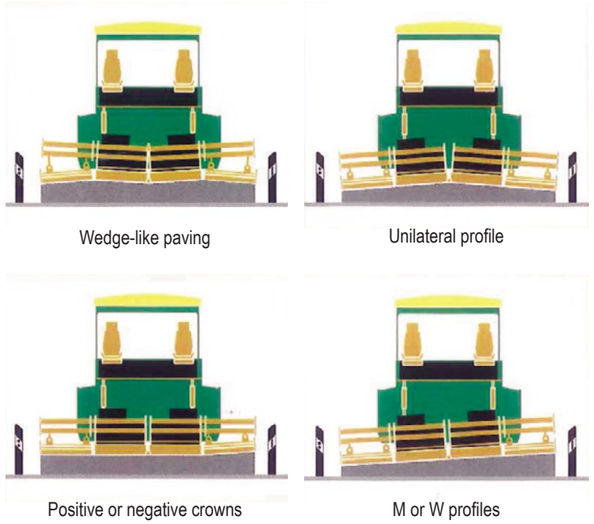
The electric heating ensures the ideal temperature for all paving components and compaction and avoids adherence of the mix and its adverse effects to the result of the paving process.

Screed adjustment

In certain paving situations, it may be necessary to intervene, specifically, in the floating behavior of the screed. For this purpose, the screed is equipped with two hydraulic pistons that are used for lifting and lowering.

The “screed assistant” function, for example, is used if the paving material has a bad bearing capacity and there is the danger of collapsing in its own weight. The screed assistant function increases the elevation and keeps the necessary elevation of the screed.

In case the paver has to stop due, for example, to lack of material, the lock of the hydraulic screed prevents the screed from sinking into the hot mix.



Paving profiles

Asphalt paving not always demands the construction of a levelled surface. Many times, the profiles have to be paved, for example, with the so-called crown to promote drainage of rainwater.

The heated compacting screed, in addition to pre-compaction the asphalt material, also levels it, defining the thickness of the layer and the shape of the track. Electronic level controls may be used, in a way to eliminate any irregularity existing on the base course that may interfere on the asphalt layer levelling. The pavers may be on tracks or on tires, according to the application and the need to obtain traction strength, as in the case of tracks, or drive speeds and maneuver ease, as in the case of the tire machine

THE OPINION OF THOSE WHO KNOW ABOUT IT

CAVALCA ENGENHARIA

Cavalca Engenharia, a company specialized in the sectors of road engineering, mining, and industrial construction, which has been present for over 45 years in Brazil, has in its fleet several pieces of equipment. Among the recent acquisitions of the company is a paver acquired for initial services on the BR-163 job, in Mato Grosso.

Engineer
Dejanir Franch

In charge of the execution of asphalt coating of the stretch from km 95 to 117 of the BR-163 road, as well as the construction of the asphalt layer of the toll plazas PP1 on km 35 (city of Itiquira), PP2, on km 135 (in Rondonópolis) and PP3, on km 235 (municipality of Santo Antônio de Leverger).

For this execution, the company used also two Ciber asphalt plants, with total production of 50,000 tons of asphalt.

According to Dejanir Franch de Oliveira, engineer at Cavalca, the choice of these machines was made based on their very high production and reliability. “I can say that in the general context of production, from the hot mix asphalt (HMA) production to its compaction, the Vögele paver is the machine, if not the most important one, among the necessary ones, for paving execution. And facing the technology of the Super 1800-3 equipped with ErgoPlus3 system, it brings reliability in a way that production and quality turn out to be limited to other reasons”, he explains.

The technique used in the construction of the coating was HMA with addition of SBS type polymer (synthetic elastomeric rubber styrene-butadiene-styrene type). The company participated of the work from October 2014 to March 21 this year.

UNIBASE ASFALTO

With over ten years in the market, Unibase Asfalto, a company specialized in earthwork, asphalt paving and equipment rental also counts on Wirtgen Group machines in its portfolio. Recently, the company used the Vögele S1800-3 in the first stage of works on the lane of Autódromo José Carlos Pace (racetrack), known as

Autódromo de Interlagos. The interventions done were recapping the surface of the official circuit and the pitlane (paved area on the side of the racetrack used for the reception of the cars), as well the adaptation of the boxes and the execution of new pitlane pavements, including the revision and complementation of the whole drainage system.

The technique used was HMA (hot mixed asphalt) with addition of polymer and also counted with the Vögele paver 1800-2, besides the "trace 3" and Hamm compacting rollers.

Adilson Souza, Unibase Director

For Adilson Souza, Unibase Director, it is important for the companies to be in tune with the constant technological evolutions and always invest in equipment to extend the action capacity. "We have recently acquired a few machines and, among those, the Vögele is an excellent piece of equipment. It has excellent productivity and is different from other due to its operational practicality, with the paving memory, directional control and with a large volume of application of the bituminous material", Adilson adds.

According to the director, to maintain the long life of the machine, a few actions are carried out. "In addition to doubling the care in transportation and operation of the S1800-3, we keep preventive maintenance up to date, as well as operator's training", he explains.

INSTALLE

Installe Engenharia, a company that has been for 25 years in the sectors of construction, recovery and maintenance of roads, lanes, airports, yards, and parking lots, also works with equipment rental. Among the machines available for rental and use of the company, there is a Vögele paver, with other pieces of equipment from the Wirtgen Group, such as Wirtgen milling machines and Hamm rollers.

According to Hamilton Reis, Installe associate and technical director, from the manufacturing process to the construction site, the whole process that involves Vögele pavers has high technology. "I saw the factories of the Wirtgen Group in Germany, and also Ciber, and the machine quality is outstanding. We noticed on the Vögele pavers, in addition to the quality, a broad range of products to meet any paving need, including basis, as well as a technical assistance structure well suited to our needs", he explains.

Still, according to the director, to obtain the maximum of the equipment, Installe trains, prepares, and recycles its personnel through courses and workshops offered at the company, and they strictly follow the equipment maintenance manual. "We also offer training through partnerships with institutions, such as SENAI, where we also assemble the first course for professional training in asphalt paving. And also through equipment manufacturers, such as Ciber, which has a workshop program on several asphalt paving equipment, such as plants, milling machines, recyclers, compacting rollers, and pavers".

Currently, Vögele Super 1103-2 is operating at sites in the metropolitan region of Fortaleza, CE. According to Hamilton, this machine is the best option for urban works, both due to the compact size and agility, as because it uses tires, which is better for use in the city.

Hamilton Reis, Installe Engenharia

"Vögele makes pavers for all types of needs, from small and narrow machines for small yards and difficult access places, going through all classes of road pavers, with large paving screeds that are extremely broad for airports and even models with preparation and reinforcements for base applications with or without cement", he says.

Picture: Ciber image files

PRECISION IN ASPHALT COMPACTION

The finishing of the paving job is the compaction of the recently laid asphalt layer. Many times, even a well-done job in the previous stages may be compromised by flaws in the final compaction. Compacting rollers for asphalt present technical differences that may cause mistakes on this stage, where vibrating double-drum rollers, tandem rollers and smooth tire rollers are used.

Vibrating rollers tandem type are characterized by adherence of the hot asphalt material onto the drum. Scrapers and water spraying are used to detach the material. It is important that the operator has a full view of the drums in order to see when the scrapers are worn and the spraying nozzles are obstructed with dirt.

Compaction along a lateral obstacle, such as a sidewalk, should be done with the lateral displacement of the rear drum, keeping the attention of the operator only on the front drum. The vibration enhances compaction and should not be used with the cold material to avoid cracking, chapping, and breaking of the aggregates.

The tire roller needs to have good conservation conditions of the tires themselves, such as the correct use of pressure calibration to obtain a homogeneous and continuous contact with the asphalt layer, as a means to execute a quality surface finishing. Pressure control is checked by the operator with the possibility of using special cleaning materials in a special tank for application on the tires. ■

DAVE COLLINGS, Project Director at Loudon International

Picture: Ciber image files

"RECYCLING EXPERTS HAVE BEEN PROJECTING INCREASINGLY MORE EFFICIENT PAVEMENTS"

ON TALKS THROUGHOUT THE WORLD, THE ENGINEER AND DIRECTOR AT LOUDON INTERNATIONAL, DAVE COLLINGS SPREADS OUT TECHNIQUES AND KNOWLEDGE TO THE PROFESSIONALS IN THE SECTOR

The more knowledge and mastering in the application, as well as technology used in the equipment that will be used for road construction and maintenance, the higher will be the quality and duration of the asphalt course and lower will be the time of the work. However, just a modern machine and excellent application techniques without trained and qualified professionals is not enough.

A means to solve this problem is to invest on training, both in practice and theory. Moreover, among the ones responsible for contributing in the qualification of those professionals all over the world, highlights to the expert in technology and solution projects in cold recycling of pavements and Projects Director at Loudon International, Dave Collings.

Graduated in 1971 with a degree in Civil Engineering from the University of KwaZulu-Natal, in Durban, South Africa, Dave has a Master's degree in Business Administration from the University of South Africa. He has worked at places such as Construtora LTA, where he developed several road, railroads, and mining projects in South Arica and at AA Loudon and Partners, a company of consultant engineers with a focus on design projects and implementation of road recovery.

In addition to these works, Dave Collings was involved in the development of recycling technology, then becoming the director responsible for projects of off shore roads at Loudon International. "There is not a country in the world, nowadays, that can claim that has a road mesh in perfect state. We are all on the same boat: increase in the traffic volume, especially heavy transportation of goods; old infrastructure and severe budget limitations that result in a descendent spiral in the general quality of the roads throughout the globe".

With the aim of helping those countries, the Loudon International expert – an international consulting firm located in South Africa that promotes the recycling technique with the support of the Wirtgen Group – gives lectures on cold recycling at several locations in the world with the goal of enabling engineers and improving the technical abilities of recyclers usage. It is done aiming at economic results even more positive for the companies and efficient to the works.

The topics of Dave Collings studies are varied, from introduction to the recycling technique, asphalt foam technology to methods of road recovery, mix projects in the lab and pavement dimensioning, among a rich range of topics related to this subject.

In recent visit to Brazil, where Dave Collings is frequently visiting different works and giving lectures, the expert was at the factory of Ciber Equipamentos Rodoviários, in Porto Alegre, RS, during the launching of the Wirtgen recycler WR200. At the occasion, Usina de Notícias had the chance to talk to him.

Usina de Notícias – What are the goals of those lectures and the importance for the professionals in the sector?

Dave Collings – To spread out technical knowledge on pavement recycling. So, to adopt this type of solution, it is necessary to have a fundamental change in the thinking of the technicians and engineers; the old methods cannot be simply adapted to a recycling option in which thick homogeneous layers are the word of the day. Just like most things in life, the technology needs to be understood so then it can be applied correctly.

UN – What are the topics approached?

DC – We show the way research on material investigation is done, project and execution, and some success cases from other countries. The topics vary, from recycling technical introduction, foam bitumen technology, methods of road recovery, mix projects in the lab and pavement dimensioning, among other topics related to this subject.

Picture: Dave Collings images

Excavating holes for trials

CEMENT STABILIZATION

OPEN COMPRESSION FORCE

CLASSIFICATION

C3: 1.5 < UCS < 3.0 MPa

C4: 0.75 < UCS < 1.5 MPa

Picture: Dave Collings images

UN – How was the development of these technologies and the way they were disseminated in other countries?

DC – Pavement recycling gained popularity throughout the past 25 years, as a result of the continuous improvement of the machines needed to do this job. Experts in this sector have been following this evolution

closely and, as a consequence, paving engineers are projecting pavements that are significantly more efficient (in terms of money invested) and long lasting (in terms of life cycle costs). Contracting organs make experimental projects and, based on good results, new projects are requested.

UN – Please describe the partnership between Wirtgen and Loudon International, in the sense of developing the asphalt recycling technology,

DC – As it is recognized that recycling is different from other paving construction techniques, Wirtgen has published a Cold Recycling Manual, which is regularly updated according to the development of the relevant application technologies. Besides, after putting over 2 thousand machines in the global market, Wirtgen is launching a broad training program, aimed at making a better use and efficiency of their machines. This training includes several modules, each one aiming at a specific application per topic, such as for example rehabilitation, design, among others.

The courses focus on more practical aspects of paving and recycling, being available at several centers throughout the world, where there is enough demand, such as Loudon International. Starting in the second semester of 2015, those courses will be a long way to correct the application and insufficiencies described.

> ***"With this method of cold recycling it is much faster to recover a deteriorated road, still with the possibility of reinforcing the pavement. 100% reuse of existing material is ecologically correct, in addition to generating good economy"***

> ***"It is necessary to have willingness from the side of the public institutions in adopting procedures and technologies that until now have not been used"***

UN - what are the favorable and unfavorable points in this sector in Brazil (taking into consideration your broad knowledge, as well as several countries you visit)?

DC – It is necessary to have willingness from the side of the public institutions in adopting procedures and technologies that until now have not been used in the country.

UN – What are the advantages of cold recycling compared to other methods available?

DC - With this method of cold recycling it is much faster to recover a deteriorated road, still with the possibility of reinforcing the pavement by adding materials, such as cement. 100% reuse of existing material is ecologically correct, in addition to the generation of savings.

UN – What is your opinion on those technical talks?

DC – They are important because they offer the opportunity for the customers to speak directly to the experts and share experiences and knowledge while we are also close to the customers and get to know their needs better.

UN – What is the importance of dissemination and instruction of recycling applications and techniques to the owners and operators of those machines?

DC – Our customer, when he participates in those meetings, he sees and learns about all benefits of our products and has the chance to learn more about the details of the machine, as well as its applications and technology. Because all advancements are geared towards obtaining a better performance with a lower fuel consumption, which is an advantage not only for them, but specially for the environment. Besides, when showing machines live, all these details can be seen, and this is very appreciated by the customers.

UN – How does the technical development of the new recyclers contribute for the constant improvement of the recycling technique?

DC – As I said, throughout the past 25 years, pavement recycling has gained popularity among the engineers and the companies that make equipment for this purpose. Among those, Wirtgen, that has developed cold recyclers since the 1990's that cut the pavement without the need of pre-heating the asphalt layer. In 1995, they launched the WR2500, the first recycler with the foam bitumen application technology. In 1997 the mobile lab WLB 10 was developed, which aids in the investigation of the existing materials on the road and in the formulation of the recycling project. It is a challenge for our engineering team in Germany, but each new discovery is seen as a contribution and a means to improve the work of our customers.

UN – Which aspects are the most important ones during application? What do the engineers always need to take into consideration?

DC – paving engineers need to consider the following: the recycling material existing in the pavement, after being milled, has to be carefully mixed right away (homogenized) in the mixing chamber. Normally, they do not change the basic properties of the recovered material (which is not just mixing with water, stabilizing the agents and/or fresh material on the surface of the existing road before recycling). The product is given by the quality and uniformity of the existing material in the pavement. It is, thus, fundamental for a broad investigation and for determining the characteristics of the recycling material.

> ***"Those treatments are frequently considered insignificant, as if they were something that could be left for the graders and roller operators. This is a big mistake, which many times results in a lower quality product"***

In addition, under load conditions, thick layers of stabilized material behave differently from several thin layers (the plastification principle). Empiric conception methods do not recognize those benefits and therefore are not appropriate. The behavior under different types of (natural and treated) materials, along with its respective failure mechanisms, should also be completely extended.

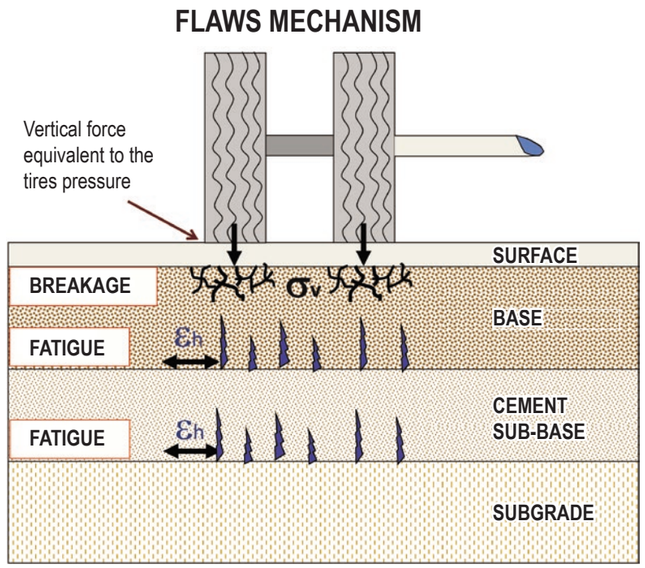


Image: Dave Collings images

In addition, there is the fact that recyclers are just like any other construction equipment, basic tools that need to be used in the appropriate way. They recycle the material, they do not build new pavement layers. The final product is not determined solely on the recycling operation; what happens behind the recycler, after the material being recovered and mixed is as important as.

Those treated materials still have to be compacted, molded and finished, in order to meet the specified requirements for a new layer. Those treatments are frequently considered insignificant, as if they were something that could be left for the graders and roller operators. This is a big mistake, which many times results in a lower quality product. Attention to detail required to other construction processes is also necessary for a recycling operation. ■

Picture: Ciber image files

COMPARATIVE COMPACTION TESTS SHOW HIGHER QUALITY AND ECONOMY

EVALUATIONS SHOW PERFORMANCE IN SOIL COMPACTION, ECONOMY, AND EFFICIENCY.

Compaction is the most important stage in the job of soils movement and earthwork. Without the use of an efficient compacting roller that ensures maximum material density, the entire quality of the construction can be compromised.

To evaluate the performance of the equipment options available in the market, labs from a few constructions companies have tested, along with the inspection of competent organs in each state, the performance of the soil compactors in the most varied ongoing works in Brazil, under several humidity conditions. In addition to the Hamm roller model 3520 P, other rollers have also been tested, here identified as roller of brand B, C, D and F.

TESTS IN GOIÁS / GO GO-070 ROAD

CHARACTERISTICS OF THE STUDY

Goal: To evaluate the performance of the Hamm roller 3520 P with the competition rollers from BRAND B and guide the team regarding the best way to use the compactor, seeking to achieve maximum efficiency.
Job: Goiás – duplication of GO-070 ROAD – stretch close to the city of Itaberaí-GO
Inspection: Trial carried out by the laboratory agents of the construction company and inspected by AGETOP (Agência Goiana de Transportes e Obras).
Characteristics of the stretch in which the equipment was used:
Soil: clay soil base
Goal: compaction in layers
Length: 500 meters
Width: 7.5 meters
Layer thickness: 20 cm
Customer: CCB Construtora
Dates: August 25, 26 and 27 2014.
Person responsible: Juliano Gewehr (Ciber)

Three machines were evaluated on a stretch of duplication of the GO-070 Road, near the city of Itaberaí. The soil of the place was predominantly a clay soil, compacted in 20 cm thick layers. The 20 ton compactor Hamm 3520 P and three 11 tons BRAND B rollers were used. The equipment was used one after the other, with the goal of reducing the number of complete passes (back and forth on the same track). With the use of BRAND B rollers, 7 or 8 complete passes were necessary. With the Hamm roller 3520 P the number of complete passes was reduced to 5.

The study concluded that the Hamm roller 3520 P obtained alone a performance that was higher to the three BRAND B rollers and on the 11 ton range, when tested simultaneously on lateral lanes. The necessary degree of compaction of the soil was reached by the Hamm roller in 5 passes, whereas the other three rollers needed from 7 to 8 passes to reach it. There was fuel economy with the Hamm roller, in the comparison with BRAND B, it got to 59%.

Picture: Ciber image files

Collection of a sample for *in loco* trial

Another important differential pointed out is regarding the area of trapezoid pad of the Hamm compacting roller 3520 P which is of 152 cm², whereas the BRAND B's is 137 cm², about 10% difference. For cohesive soils (clay type) the higher the pad area, the deeper the compaction, in addition to facilitating the removal of humidity of the land, favoring compaction.

COMPARISONS AND RESULTS

Equipment	1 Hamm roller 3520 P	3 rollers BRAND B in sequence
Complete passes	5	8
Number of passes	10	16
Degree of compaction	Above 100%	Above 100%
Fuel consumption	16.5* liters	13 liters
Hours worked	1 hour	1 hour

IMPORTANT: Considering that the HAMM roller model 3520 P executed the performance of three BRAND B rollers, the economy in fuel consumption is of up to 59%.

Compaction in four points of the stretch done by the Hamm Roller 3520 P	Complete passes (going forward and going back)
Stretch 1	106.2%	5
Stretch 2	106%	5
Stretch 3	105.6%	5
Stretch 4	106.5%	5

Important: the degree of compaction of the Hamm Roller used in the test surpassed 100%, so the engineers in charge recommended decreasing from 5 to 4 complete passes, which would result in even higher gains in time and savings.

TESTS IN RIO DE JANEIRO/ RJ
UHOS ACCESS ROAD – COMPERJ

CHARACTERISTICS OF THE STUDY

Goal: Comparative test between vibrating compacting rollers of a Hamm 3520 P brand cylinder and BRAND D 11 tons. The equipment was put in operation side by side.
Job: UHOS (ultra heavy over size) Acess Road - COMPERJ (Rio de Janeiro Petrochemical Complex)
Inspection: Trial carried out by laboratory agents from TecnoInst Serviços Técnicos Ltda.
Characteristics of the stretch in which the equipment was used:
Soil: grit type, which is a product from quartz rocks – leuco granite feldspathic, such as granite and gneisses, have permeable features and mechanically disassemble, extracted from nearby deposits.
Goal: compaction in layers
Length: 60 m
Width: 12 m
Slope: 0%
Layer thickness: 30 cm
Customer: Carioca Engenharia – Christiani - Nielsen
Date: June 10th, 2014.
Responsible: Engineers Diogo, Davi and Lucas

A work of relevance because it consists of the road responsible for supplies traffic going to COMPERJ (Petrochemical Complex of Rio de Janeiro), a project of a refinery construction with two lines of oil processing. At the location, a comparative test was carried out between the Hamm compacting roller and the BRAND D roller.

The soil of the place is grit type, which is a product that comes from the quartz rocks. The stretch where it was done was 60 meters long and 12 meters wide, completely flat. The thickness of the layer was of 30 cm and its humidity was of 10.5%.

Provided that the Hamm roller was a 20 ton roller and BRAND D was an 11 ton, the proposal of the test was to do 6 passes with the first and 12 passes with the second, respectively, analyzing the results. The two of them produced similar soil compaction degrees: 99% and 99%. However, the Hamm compactor reached this result with half the passes of the BRAND D equipment and in half of the time. It is possible to conclude that the Hamm roller at the end of the tests presented twice the efficiency of the BRAND D roller.

COMPARISONS AND RESULTS

Equipment	Hamm 3520 P	BRAND D
Complete passes	3	6
Number of passes	6	12
Degree of compaction	99%	99%
Soil humidity (%)	12.2	12.8
Hours worked	3	4
Consumption average (l/h)	13	13.2

In the testes done, fuel consumption was one of the main differentials of the 20 ton Hamm roller. Considering that this roller 3520 P has a 6 cylinder engine and air condition, and yet it performed with high efficiency the job that required two BRAND D rollers to be done, with 4 cylinders engines and open cabin, that is, more engine power and air conditioned cabin resulting, nevertheless, in a lower fuel consumption.

Picture: Ciber image files

Lab trial

TESTS IN CEARÁ / CE
FORTALEZA URBAN ROAD

CHARACTERISTICS OF THE STUDY

Goal: Comparative test between single drum vibrating compacting rollers, a Hamm brand 3520 P and BRAND C, BRAND E and adapted rollers tamping type BRAND F.
Job: IV Anel Viário de Fortaleza – Via de Ligação – Distrito Industrial – Ceará.
Inspection: Trial carried out by the lab agents from JBR Engenharia.
Characteristics of the stretch in which the equipment was used:
Soil: Clay type soil – sandy soil, from the J7 deposit – leucogranite, with granite and gneisses, and they have permeable and mechanically disassemble features, extracted from nearby deposits.
Goal: compaction in layers
Length: 40 m (stakes 284 to 286) / 190 m (stakes 319 to 328).
Width: 11 m
Slope: 0% / 5%
Layer thickness: 20 cm
Customer: Carioca Engenharia – Christiani - Nielsen
Date: August 6, 2014.

The main work done in federal roads that pass through Ceará in the past 25 years, the Fortaleza Inner Ring Road will relieve the heavy traffic in the region. At that location, comparative tests between single drum vibrating compacting rollers Hamm brand 3520 P and BRAND C, BRAND E and adapted rollers tamping type BRAND F were done. The machines were put into operation side by side for the comparative tests.

The stretches where the tests were done had a sandy clay soil and 40 and 190 meters, each one. The first stretch was plain and the second had 5% slope, in addition to the layer thickness of 20 cm.

With the same number of passes, the Hamm brand equipment presented a degree of compaction of 97%, against 84.6% of BRAND E equipment, and 94.5% of BRAND C roller.

COMPARISONS AND RESULTS

Equipment	Hamm 3520 P	BRAND E	BRAND C
Complete passes	5	5	5
Number of passes	10	10	10
Degree of compaction	97.0%	84.6%	94.5%
Soil humidity (%)	10.0	10.6	11.0
Hours worked	5	6	5
Consumption average (l/h)	16.8	16.5	20.8

Compaction between the vibrating rollers to reach 100%:

Equipment	Hamm 3520 P	BRAND E	BRAND C
Complete passes	6	12	9
Passes	12	24	18

In summary, in order to reach 100% compaction, the Hamm roller used half the number of complete passes and passes when compared to BRAND E roller and 33% less complete passes and passes compared to BRAND C roller.

The model of roller tested from BRAND F is an adapted piece of equipment with a tamping type roller that uses the static mode to reach the desired degree of compaction. The equipment uses its weight and speed (above 17 km/h) to create impact forces through the padfoot drums.

This type of machine has certain limitations, such as for example, the need of large areas to be able to compact, as well as the place for increasing and decreasing speed to reach 17 km/h and be able to break. It also presents high fuel consumption and noise emissions, above 100 decibels. In many cases, it is noticeable that the emission of pollutants is not in agreement with the current regulations, and, in addition, the way it is operated offer safety risks for the operator.

COMPARISONS AND RESULTS

Equipment	Hamm 3520 P	BRAND F
Complete passes	3	15
Number of passes	12	30
Degree of compaction	100.5%	100%
Hours worked	5	2
Consumption average (l/h)	16.8	37.0

The final result was very clear and superior for the Hamm roller 3520 P in relation to the BRAND F roller. The number of necessary passes and complete passes with the Hamm roller was twice less in relation to BRAND F roller, excelling a highly expressive fuel economy gain, as shown in the following chart:

Consumption X Hours worked

Equipment	Hamm 3520 P	BRAND F
Hours worked	1500	1500
Price (R$)	2.39	2.39
Consumption average (l/h)	16.80	37.00%
Total (R$)	60,228.00	132,645.00

Work costs

Equipment	Hamm 3520 P	BRAND F
Total hour cost (R$)	158.41	322.27 (*)
Estimate work value (h)	1500	1500
(Estimate project value (R$)	237,615.00	483,405.00

COMPARISON OF EQUIPMENT USED IN THE TESTS

Equipment	HAMM 3520 P	BRAND B	BRAND D	BRAND E	BRAND C	BRAND F
Maximum weight	21.730 kg	11.350 kg	11.600 kg	11.950 kg	12.300 kg	24.000 kg
Engine	Deutz 207,7 hp	Deutz BF4M 2012 C	Cummins 110 hp	Cummins 125 hp	Cummins 145 hp	Cummins 220 hp
Frequency	27 Hz / 30 Hz	30 Hz / 36 Hz	33 Hz	33 Hz	33 / 30 Hz	-
Amplitude	1.93 mm / / 1.15 mm	1.84 mm / / 0.92 mm	1.6 mm / / 0.8 mm	1.8 mm / / 0.8 mm	1.95 mm / / 1.0 mm	-
Centrifugal force	331 kN / / 243 kN	310 kN / / 222 kN	300 kN / / 146 kN	307 kN / / 150 kN	270 kN / / 150 kN	-
Number of pads	150 patas	150 patas	130 patas	140 patas	132 patas	-
Area of the pad	152 cm²	150 cm²	146 cm²	137 cm²	114 cm²	-
Dynamic impact	45.790 kgf	38.870 kgf	30.591 kgf	29.200 kgf	-	-

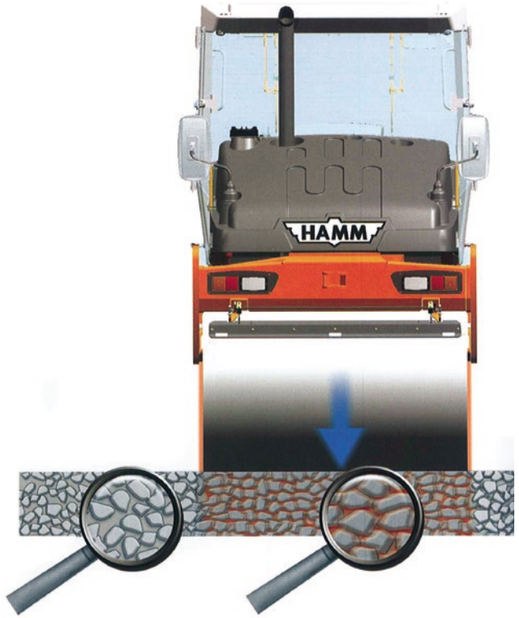
DYNAMIC COMPACTION

The dynamic systems provide better penetration and a more efficient compaction than the static drums. Currently, due to the major efficiency of this technology, over 90% of drums all over the world use dynamic compaction.

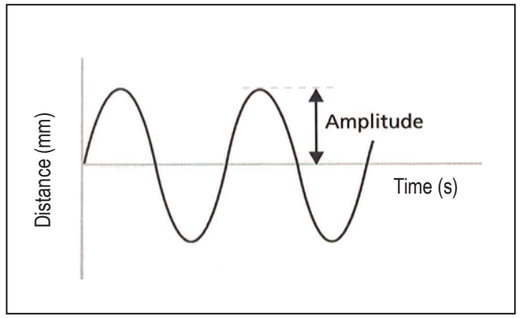
In dynamic compaction, weights of uneven value are used to move the drum of the cylinder. Resulting vibrations are transferred to individual particles of the material to be compacted. That decreases friction resistance between particles (change from low activity static friction to dynamic friction), which will foster particle movement. Along with the static load of the cylinder, a much higher compaction is reached. Most dynamic cylinders work with vibration. In this process, the rollers are put to work in a way to hit the soil with vertical strokes. Hamm developed another dynamic compaction system: oscillation. This is a type of special dynamic compaction; instead of vertical forces, the shearing forces are sent straight to the soil or for the asphalt layer. That produces smooth compaction, but much more efficient.

The specific factors of the mechanism to reach a good compaction through the use of dynamic cylinders are:

- **Static linear load;**
- **Amplitude;**
- **Frequency;**
- **Vibrating mass;**
- **Suspense load;**
- **Speed of the cylinder.**



Principle of dynamic compaction: vibrations from the cylinder are transferred to the particles in the material to be compacted. Instead of static friction, this process produces a much inferior dynamic friction between the particles, which will then cause the displacement and respective compaction.



In the vibrating cylinders, the roller moves up and down. In the case of oscillatory cylinders, the amplitude measures the movement of the cylinder, back and front, on the contact point. In this case, it is about tangent amplitude.

AMPLITUDE

Amplitude measures the movement of the vibration roller/oscillation, from the initial position, in operation.

The higher the amplitude, the higher the compaction energy produced by the cylinders, vibration or oscillation. It is necessary to take into account that the operative weight of the cylinder also has a major impact on the amount of energy produced. Thus, the amplitude alone cannot be used to determine the compaction capacity of a cylinder.

The amplitudes which are higher than 1.0 mm are appropriate for compaction of materials that have a low bearing capacity (cohesive) or for compaction of thicker layers. The lower amplitudes are more suitable for materials with a higher bearing capacity, for thinner layers and for surface compaction. The lower the height of the material to be compacted and the necessary impact force, the lower the amplitude should be, as a means to prevent damaging fragmentation.

Dynamic compaction through vibration
Low amplitude – minimum impact force - minimum penetration

Dynamic compaction through vibration
High amplitude – high impact force – high penetration

Normal amplitudes for compaction of lands with vibration cylinders vary between 0.7 and 2.0 mm. In practice, a higher amplitude with the same vibrating mass means a higher compaction and penetration.

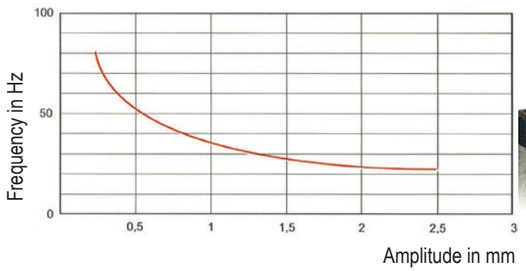
In the case of asphalt compaction with vibration tandem rollers, low amplitudes are specially used, between 0.25 and 0.8 mm as a means to avoid the destruction of particles and asphalt deformation due to impacts that are too strong.

FREQUENCY

In compaction technology, the frequency is the number of times the unbalance mass in the cylinder rolls per second, generating the compaction movement. The frequency is measured in hertz (Hz); for example, 30 Hz is equivalent to 30 strokes (vibrations) of the roller per second.

The frequencies should be selected according to the amplitude configuration of the machine. A basic principle is:

LOW AMPLITUDE – HIGH FREQUENCY
HIGH AMPLITUDE – LOW FREQUENCY



The high frequencies are chosen for low amplitudes and the low frequencies are chosen for high amplitudes.

In earthwork, frequencies between 25 and 50 Hz are used, depending on the material to compact and the configuration of amplitude. The frequencies used in road construction are, by regulation, higher than the earthwork ones, as a means to avoid asphalt deformation due to excessive spacing between the strokes.

VIBRATING MASS

The vibrating mass of one drum is composed by the drum(s), by the hydraulic motor, and by the vibration or oscillation unit. The drum of the cylinder is separated from the rest of the machine by rubber buffers.

SUPPORTED MASS (LOAD MASS)

The load acted by the one drum cylinder includes the vibrating mass previously described and the supported mass. The supported mass, also called load mass, is equivalent to the part that is separated from the drum of the cylinder by the rubber buffers. The higher the cylinder, the larger the load mass will be.

The weight the load mass puts pressure on the material that is to be compacted, considerably contributing to the compaction result. However, the vibrating mass and the relation between both variables that mostly affects the compaction performance.

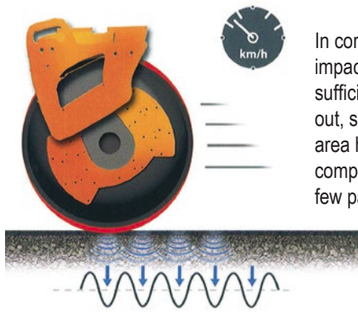
The "vibrating mass" (marked in red on the image) of one drum includes the drum of the cylinder, the hydraulic engine and the vibration or oscillation unit.

SPEED OF THE CYLINDER

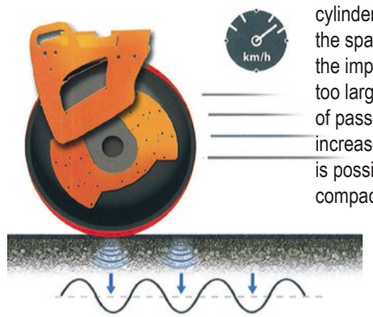
Especially in dynamic compaction, the cylinder speed affects the time and the frequency of the application of compaction forces in a specific area. When frequency is the same, there are more impacts at a low speed than at a high speed.

If the speed is too high in relation to the vibration frequency, the individual impact points are too far from one another. The compaction energy per area is lower, which demands a higher number of passes.

Besides, if the impacts are too spaced out, there is the risk of material deformation.



In correct speed, the impact points are sufficiently spaced out, so than the whole area has the necessary compaction with just a few passes.



If the speed of the cylinder is too high, the spacing between the impact points is too large. The number of passes should be increased so than it is possible to reach compaction as desired.

OSCILLATION

Currently, the advantages of compaction through vibration in relation to static compaction are undeniable. Hamm has optimized this solution and developed an oscillating roller. The oscillation cylinders are high output machines. They compact at a low impact, thus avoiding environmental damage and damage to nearby buildings. Less passes are also necessary thank with the cylinders that use vibration technology. It is important to say also that during the use of oscillation, compaction increases continuously, the material structure is not fragmented. Another advantage of oscillation is the excellent finishing of the surface of compacted layers.

Oscillation is a technology patented by Hamm. An oscillating roller is equipped with two eccentric beans of different weights that rotate in synchrony. The weights on both axles are disposed in an opposite way to one another. They force the drum of the cylinder to rotate in a movement that rapidly alternates front and backwards. As opposed to a vibrating roller, the oscillating roller is in permanent contact with the soil.

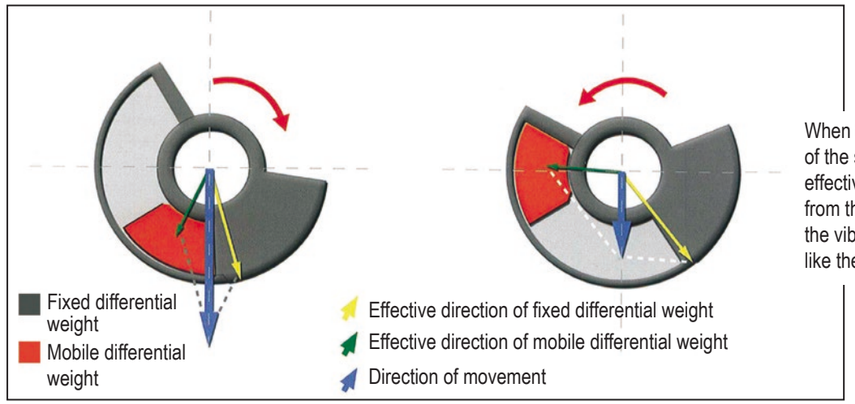
VIBRATION

Currently, it is not possible to imagine a road construction work or earthwork without tandem rollers or soil rollers with vibrating drums. Vibration is a proved method that ensures results in several conditions, in soils and asphalt.

The impact that generates compaction of vibrating cylinders results in the interaction between the frequency (caused by unbalance of weights in the drum), amplitude, speed of conduction, the weight of the roller and the shape and size of the area to be compacted. However, the level of compaction also depends on the properties of the material to be compacted and the paving conditions.

Vibration of the drums of the rollers is generated through a rotational unbalance of weight in which the rotation speed determines the vibration frequency. This weight unbalance consists of a fixed part and another one that is not fixed – the mobile weight. The position of the mobile weight depends on the direction of the rotation of the eccentric beam. The effective weight that results from the weight movement increases or decreases through the rotation direction. This allows the drum of the roller to vibrate at two different amplitudes.

The use of vibration is appropriate for almost all earthwork applications and road construction. ■



When the rotation direction of the shaft is reverted, the effective weight that results from the weights unbalance in the vibration roller is altered, like the vibration amplitude.

From left to right: Raphael Pontes, Daniel Silveira, Jonas Martins, Claudio Koeler, João Vieira, Wagner Esmeraldo, Alexandre Pereira and Eder Angelo

Picture: Felipe Silva

RENTAL: AN EFFICIENT AND FEASIBLE ALTERNATIVE

A SOLUTION THAT ALLOWS COMPANIES TO MAINTAIN QUALITY OF THE WORKS USING MODERN AND TECHNOLOGICAL EQUIPMENT

In order to carry out asphalt paving with quality and durability, be in construction, maintenance, or road repair, it is necessary, besides trained professionals and specific techniques that meet the demands, suitable equipment with high technology.

Depending on the size, time, and profile of the work, many times machinery rental is a good option, today it is already available in the market and with a broad range of equipment in constant renewal. Equipment rental is not a recent modality, there are already specialized companies in this segment. It is the case of Rio Rental, a company of the LCMAK Group, which has been in this sector for over a decade, renting machines and equipment of small, medium, and large size.

TARGET PUBLIC

According to Jonas Martins, commercial manager at Rio Rental, the public and the segment served are very diversified. "We serve large constructions companies of road paving and maintenance, roads, and highways as well as small and medium size contractors in civil construction. For that, we seek to understand the needs of our customer and propose the most appropriate solutions through the supply of quality and high performance equipment so then they are successful in the execution of their services", he explains.

The rental process starts with fostering products/services and from the understanding of the needs of the customer so than the company may suggest the best solution in equipment for each case. After this evaluation, negotiation is carried out, both in terms of values, deadlines, as well as payment terms. Once the interest is confirmed, the rental deal is closed. At the end of the contracted period, there is the return of the equipment or the renewal for a new term.

> "It is important to highlight that, during the period hired, we are always available to our customers to solve eventual issues related to the rental deal, in all areas, operational, commercial, or administrative, or to meet new demands. Once the equipment is returned, we carry out evaluations of the whole process developed during the rental period, inclusive customer satisfaction, and then we restart the commercial cycle with new ventures seeking other opportunities", Jonas explains.

FLEET

With the aim of building efficient relationships with partners and customers, Rio Rental invests increasingly more on the training of its employees and in the creation of a diversified fleet of equipment of high quality offering

Picture: Rio Rental images

its customers solutions for the execution of the most varied services.

Among the equipment that Rio Rental has available, there is a varied range of models and functions. Highlights to the Wirtgen Group equipment, which makes up a good deal of the fleet with Hamm compacting rollers and Wirtgen milling machines.

> "Over 40% of our rollers fleet is made by Hamm equipment, making the Wirtgen Group one of our main suppliers. This partnership grows and becomes stronger each year", Jonas Martins explains.

This amount is due to, according to the commercial director, the quality of the equipment as a whole: "These are high productivity machines, with cutting edge technology, good performance, low fuel consumption, safe and comfortable for operation".

The acquisitions started in 2008. "During a presentation of the 3411 Hamm roller at the Sorocaba (SP) Expo, the demonstration of strength, consumption, comfort, and balance of the equipment made a good impression on us. Thus, by seeing the opportunity of providing a different product to the market and believing Ciber proposal and the quality of the equipment, we invested that same year on two units. This partnership has lasted for years", he said.

Picture: Rio Rental images

According to Jonas, for the ones who wish to enter or seek consolidation in the equipment rental business, it is necessary to be aware of the market trends, offer practical solutions to customers with quality equipment, which also has good performance and that express reliability, in addition to a broad and diverse fleet. A solid structure and excellent relationship with suppliers are also primary requirements.

Another important point is to be aware that, in certain cases, the customer does not know exactly which equipment he should use and the renter should indicate the most appropriate one. For this reason, it is necessary to have a trained team, with professionals that know the equipment and constantly go through professional improvement programs. “For the customers, a rental company that is aligned to the technological innovations and offer not only new equipment, but also a good technical assistance, will always be ahead”.

Picture: Felipe Silva

Jonas Martins

EXPECTATIONS

With the current scenario of the Brazilian economy, instable and demanding immediate adjustments, Rio Rental, just like a good deal of the companies of the equipment rental segment has also seen the impact due to the country’s present moment. However, for being in a consolidated position and for having trained professionals, the company has sought alternatives to surpass this moment: “We are reacting through innovative and differential alternatives, adapting ourselves to a new market profile: reduced, but competitive and seasonal. We believe it will pick up growth again, but in a slow and smooth way. This adversity sounds as an opportunity to us, since many companies, due to the market lack of confidence, have in rentals an excellent savings option, both in maintenance cost and having the equipment out of use. Apart from that, construction works will always be a good idea to resume growth in the economy and development, thus is unthinkable that they would not happen”.

Picture: Rio Rental images

Nowadays Rio Rental serves simultaneously with Wirtgen Group equipment the main construction works in the state of Rio de Janeiro. Some of them are, Passeio Olímpico, Parque Olímpico, COMPERJ works (Petrochemical complex of Rio de Janeiro), in addition to maintenance and paving of streets in the metropolitan area of Rio de Janeiro, Road BR-040 and Nova Dutra.

To better serve the public in the Southeast region, Rio Rental intends to expand its activities fixing bases in the regions Serrana or Juiz de Fora - MG, North and South of Rio de Janeiro, and thus to extend its rentals for the neighboring states, and with that it will speed up technical services, reducing costs related to logistics and allowing for a better commercial relation in those regions. For that, the company intends to keep investing in structure, human material, and mainly in broadening the fleet with quality equipment, as the ones offered by the Wirtgen Group. ■

CIBER STARTS PRODUCING THE VÖGELE SUPER 1300-3 IN BRAZIL, TO BE LAUNCHED AT THE M&T EXPO

SUPER 1300-3 is the first Vögele brand paver to be manufactured in Brazil by Ciber Equipamentos Rodoviários, a Wirtgen Group subsidiary, and it will be in exhibition at the company booth during the M&T Expo 2015. This equipment has a compacting screed with electrical heating, ensuring 100% homogeneity in temperature, in addition of being compact, its size makes it ideal for a variety of applications. With a production capacity of 350 tons per hour, the machine will be first in national production with a compacting screed with electric heating, ensuring 100% temperature homogeneity.

The SUPER 1300-3 has a new operational system ErgoPlus3, standard in this series of Vögele pavers, that combine ergonomics, total visibility, and easy equipment control through an intuitive panel with universal symbols. The operator console, for example, has a colorful screen that offers readability even in poor light conditions.

The pre compaction system with tamper and vibrating plates is able to reach higher levels of compaction. The SUPER 1300-3 also counts with the Compacting Screed Display, which disposes of a color screen with work information and integrated levelling system.

Other advantages of the Vögele SUPER 1300-3:

> SmartWheel drive to open and close the screed in a more precise way, without bumps;

> AutoSet Basic system, which allows all paving parameters to be saved on the memory, making it possible to bring the machine back and go back to the previous configuration with only one click of only one button;

> Modern Deutz engine of 74.4kW;

> Capacity of the fuel tank of 110 liters.

From now on, you will be able to acquire the paver Vögele S1300-3 produced in Brazil, with immediate availability of parts and highly trained technical specialists, and with FINAME. ■

Picture: BR-163/MT Engineering sector

THE PATH OF DEVELOPMENT

WORKS ON THE BR-163, IN MATO GROSSO, IMPROVE THE CONDITIONS OF PRODUCTION DISTRIBUTION REDUCING COSTS AND BRINGING DEVELOPMENT FOR THE REGION

For a state whose main activity is the agricultural production, being one of the main grain producers such as soybeans and corn in the country, the quality and conservation of roads is a primary demand for distribution of production. But this is not the reality, for now, in Mato Grosso.

The Road BR-163, which is the main path to Brazilian ports, specially to the Brazilian Midwest, responsible for 56% of grain exports in the country, according to the FIEMT (Federation of the Industries in the State of Mato Grosso) is in bad conditions. Still, according to the Federation, this situation generates an additional R$ 2 billion per production with freight.

To avoid problems and damage like these, ANTT (Agência Nacional de Transportes Terrestres - National Agency of Road Transportation) has attributed to Concessionária Rota do Oeste S.A., a company by Odebrecht TransPort, a concession of 850 kilometers from the road, resulting in the decrease of the fuel consumption, in trucks maintenance, as well as the time used on the travel, in addition to attracting new investments for the region.

"The industrial sector in Mato Grosso will only grow with that and, consequently, it will help strength Brazilian economy. After all, it is not possible to make a developed country without a strong industry, and there is no strong industry without good roads", adds Jandir José Milan, FIEMT President

HMA execution in the duplication

THE JOB

The BR-163 connects Rio Grande do Sul to Pará, with a total of 3,467 kilometers of extension, and almost one thousand are not paved, according to the Ministry of Transportation portal.

The work is done in Mato Grosso starting in the border with Mato Grosso do Sul up to Sinop, with a total of 850.9 km of extension (from km 0 to 850), going through 19 cities, where works of improvement and duplication, restoration, maintenance and signaling. Considered as one of the more critical points of the national road mesh, the stretch is responsible for 70% of accidents registered on Mato Grosso roads. Currently, about 8 thousand vehicles are on the BR-163 daily, in its majority load trucks.

Rota do Oeste Concessionary, a company by Odebrecht TransPort (founded in 2010 which develops, implements, operates, and participates of companies in the urban mobility areas, roads, airports, and logistics), they won the auction of the road and were responsible for the duplication and administration of 453.6 km from the total 850 km of the road on the border with Mato Grosso do Sul, on km 0, up to Rondonópolis, the Rodovia dos Imigrantes (BR-070), in the metropolitan region of Cuiabá and the entrance to Posto Gil, in Diamantino, up to Sinop. The remaining 400 km between Rondonópolis and the entrance to Posto Gil, are responsibility of the DNIT.

The concession started in March 20th, 2014, as a part of the third stage of the Program of Investments in Logistics of the Federal Government, launched in 2012, will last 30 years. Still according to Rota do Oeste, around R$5.5 billion will be invested during the three decades.

Picture: BR-163/MT Engineering sector

On June 9, the Rota do Oeste Concessionaire started the works by hiring Odebrecht Infraestrutura. In this phase, according to the company, a 22.7 km stretch between the city of Rondonópolis and the multimodal terminal of the ALL (América Latina Logística). The concessionaire has also done interventions in a 28 km stretch in the surrounding of Cuiabá, from km 0 to 125 in the South of the state and 60 km that are in the surroundings of the city of Nova Mutum. The places have been chosen for being the most critical points of the stretch conceded to the company.

"In the first five years, when R$2.8 billion reais will be invested, the duplication of a 453.6 km stretch will be duplicated, between the border with Mato Grosso until Rondonópolis, from Posto Gil to Sinop, in addition to Rodovia dos Imigrantes. The remaining extensions are already duplicated or will have the works executed by the National Department of Transport Infrastructure", explained Frederico Holtz, equipment manager at Odebrecht Infraestrutura.

The company will build nine toll plazas, one at every 100 km. The value of the toll plaza fee offered during the auction was R$ 0.02638 per kilometer, being R$2.63 at every 100 kilometers. According to the company, the charging of the fee will start in the second semester of 2015.

Execution of the second HMA layer


Pictures: BR-163/MT Engineering sector

TECHNIQUE

For being the route to distribute production with heavy vehicles, it may present a total gross weight of 45 tons, according to CONTRAN (National Traffic Board) regulation and the chart specified by the DNIT, the technique used should resist the intense flow and load of vehicles without losing quality and durability.

Thinking about it, the choice was to use HMA (Hot milled Asphalt) with addition of polymers both in the duplication and repair stretches. The polymer, when added inside the tank of the plant during the production of the asphalt mix, adds properties to the mix, enhancing it.

"It is the product of the mix of aggregates of several sizes and asphalt cement, both heated to previously defined temperatures, due to the viscosity-temperature characteristic of the binding agent", explains the product specialist at Ciber Equipamentos Rodoviários, a subsidiary in Brazil of the Wirtgen Group, Marcelo Zubaran.

EQUIPMENT

To ensure agility and quality at the job site, Odebrecht Infraestrutura invested in the use of Wirtgen equipment. Among them, the new Vögele Super 1800-3 paver, which is ideal for execution of projects in roads and highways of a large width, as it is the case of the BR-163, presenting the same perfection of when it is required to overcome narrow spaces. Since its development happened based on the motto "less fuel consumption – less emissions – less expenses", and on aspects such as ergonomics (that aims to adapt the human work to the construction of the machine), it was the most assertive choice for the job, due to the fact of being so extensive and long-lasting.

Just like the paver, the cement spreaders Streumaster SW 16 MC are new pieces of equipment in the Brazilian market, which reinforces Odebrecht Infraestrutura investment in ensuring the quality of the work. SW 16 MC ensures practicality because it is assembled on a three axles truck, being conducted by it and controlled through a dosage rotating valve with electronic control, facilitating the operation and communicating to the operator to intervene in the distribution data whenever necessary.

Another relatively new equipment which is part of the work is the asphalt recycler and soil stabilizer Wirtgen WR 240. Versatile, it operates at nine cutting speeds that may vary according to the stiffness of the material to be recycled. Moreover, for having a working width of 2,400 mm and a maximum working depth of up to 50 centimeters, it produces uniform layers in less time.

The Hamm compactors for asphalt GRW 280 and HD90 are also part of the work. Compact, the tire roller GRW 280 offers better comfort, safety, and visibility to the operator, who can move the operation platform to both sides, in addition to turning the seat. The split tire axis favors maneuvering in reduced spaces and change of the middle tires, besides being equipped with a system to fill up the tiers for pressure control, fundamental for a high quality asphalt compaction.

With a diesel engine, the asphalt roller HD90 presents a high power and low noise level. It counts with water spraying through the system with two pumps, sprayers visible from the operator's seat and crab mode steering, which allows working with lateral obstacles, such as a sidewalk, and integral hydrostatic traction.

INITIAL STAGES

With almost one thousand kilometers of extension and three decades for total execution, the work on the BR-163 had the participation, in a few stretches, of other companies for the execution of initial services, such as hole filling, manhole recovery, replacement of asphalt cover, vertical and horizontal signaling, and small repairs throughout the whole extension.

On March 24, 2015, the day the Temporary License and Installation for continuing the duplication of the over 450 kilometers of the road under responsibility of Odebrecht TransPort was issued, so these works continued.

"Rota do Oeste Concessionaire, a company of Odebrecht TransPort, took part in the action, got the concession and is carrying out the work through Odebrecht Infraestrutura. In June 2014, we started the initial works on the stretches that are not being duplicates or in maintenance contract of other companies hired by the DNIT. With the issue of the LI, there will be several steps, an average of 200 km/year, being 100 km of new lane and 100 km of recovery of the old lane", completed Frederico Holtz.

TECHNICAL INFORMATION

- **Job:** Duplication, restoration, and maintenance
  Place: MT – from MS border up to Sinop
  Length: 850 km total
  Technique: HMA with polymer addition
  Start: Initial activities in 04/2014
  Phase 2 – March 23, 2015
  Completion: March 2019

Picture: Seoing images

ON THE WAY OF THE INCAS

SIX MODELS OF CIBER ASPHALT PLANTS WORK IN THE CONSTRUCTION OF A NEW PERU, WITH BETTER ASPHALT QUALITY

In June 2014, during the ceremony held on the Salão Dourado of the Peruvian Government House, a man received a mission from President Ollanta Humala. This person is called José David Gallardo Ku, Minister of Transports and Communication and has as his challenge to reach, by the end of next year a significant increase in the percentage of paved roads in Peru, which up to December was equivalent to only 15% of the total of national roads, according to the local press.

Gallard asserted that as soon as he took office, that his portfolio should invest about US$ 22 billion in road infrastructure works, as well as try to reduce bureaucracy of the processes of licenses related to vital works in the country that have turned Peru into a real “job site”.

With a few plants throughout the country, it is possible to say that Ciber is providing direct support to the road development of this new Peru, through the works and interventions of five large local companies. Seoing E.I.R.L., founded 20 years ago, already operates with Ciber plants. One of them used in works at the Interoceânica, which connects Peru to Brazil, more precisely in the Cusco region, where 17 kilometers of works have been done, delivered in January 2015. The place is 3,450 meters above sea level and has dense roads, with a large relief and much more sensitive to the sudden changes in climate during the day, a characteristic of the region.

With temperature variation, the asphalt aggregate content is 5.5% per m^3 that, added to the quality of the mix comparable to the Ciber plant, ensures that the PAC applied may give a higher useful life to the asphalt mass, considering that the region has suffered, historically, with the lower durability of the asphalt. The paving operation on the road presents asphalt with 10 cm thickness.

“We chose the Ciber plant because it presents the best mix, in addition to mobility. For a country such as Peru, that in the past few years have had so many construction works, we believe that those characteristics of the machine are important for us to do our work” explains Sergio Strada, president of Seoing E.I.R.L.

The company is also working on jobs in the metropolitan region of Lima, with the production and application of asphalt on streets and avenues of the capital, as well as in adjacent cities, such as São Luis, San Martin de Porres and Independencia. The content of asphalt aggregate used in most of interventions is 6% per m^3, with application of a concrete surface, so then the asphalt resists to the most intense temperature and humidity variations in the region of Lima.

Two other Ciber plants are working on the road Panamericana Norte, also known as Autopista do Sol, which has 86 kilometers and connects Lima to the Northern region of the country. Both plants belong to the company Ditranserva.

For this job, Ditranserva chose the application of asphalt with modified polymers, which are ideal for Autopista do Sol, due to its marked curves, in addition to the technique to allow the pavement to present a better draining capacity, increasing the safety of drivers under rain, since it absorbs the water and prevents the formation of spraying through aquaplaning.

The operations director at Ditranserva, Victor Castro, highlights the performance of the most recent plant acquired by the company. “Ciber iNova 1200 P1 presents a series of technology features that has helped the work that we do, such as remote monitoring and access to information in real time in any computer for on-line management of the process. We are also satisfied with the RAP performance reached, which has been highly expressive”. ■

BRAZILIAN MILITARY FORCE LAUNCHES BOOK ON MILITARY ENGINEERING

Pictures: Diretoria de Obras de Cooperação (Board os Cooperation Works)

DIVIDED IN TWO VOLUMES, THE BOOK NARRATES THE MAIN MILITARY DEEDS AND RECOVERS THE HISTORY OF THE ENGINEERING OF THE BRAZILIAN MILITARY FORCE

Ensure the safety of the nation and contribute for the national sovereignty are important missions of the Brazilian Army. However, in addition to those, cooperating with the social wellbeing and the construction of the national development are also commitments and missions of the institution. Therefore, to demonstrate the other services given to the nation, the Department of Engineering and Construction (DEC) launched the book *A Engenharia do Exército na Construção do Desenvolvimento Nacional* (Army Engineering in the Construction of National Development).

With the sponsorship from Ciber Equipamentos Rodoviários, the book reports the engineering of the Brazilian Market and its participation in more broad works for the country. In two volumes, it portrays in a broad way both the historical view of the Military Organizations of Engineering and the services offered. It describes peculiarities on the execution of the main works and services of road, railway, hydro way, and port engineering ever done by the Brazilian army, with maps, pictures, and complemented by interviews.

COLLECTION

Done in teams, the project was proposed by DEC, under the direction of Diretoria de Obras de Cooperação, organized by Colonel Washington Machado de Figueiredo, Engineering Official, recently deceased, who also wrote the book. In a period of one year, the writers and commanders Edmar César, Emerson Rogério de Oliveira and José Narciso Santana also got together to prepare the work.

"It was not possible to narrate all the constructive deeds of the army throughout the centuries of its existence, thus it is not a finished work. There is still a lot to tell to the Brazilian nation", Capitain Narciso said.

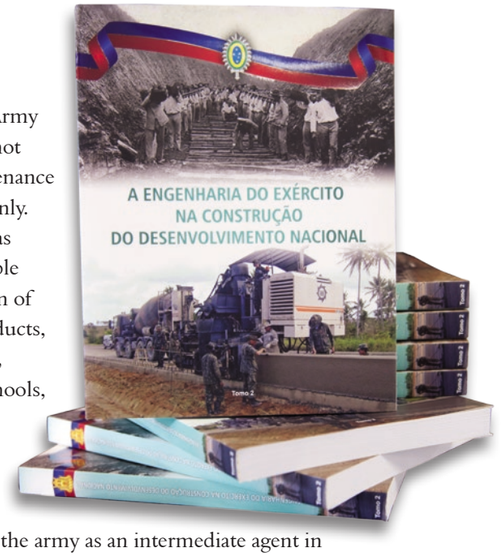
Still according to the Captain, the need to rescue a debt with the Brazilian nation and with the ones who made the engineering in the past and gave us today's engineering was the motivation for writing the book. "With that, in order to make possible a dream that was nourished in the soul of the constructors from earlier times, in the heart of the Diretoria de Obras de Cooperação, the project 'A Engenharia do Exército na Construção do Desenvolvimento Nacional' was created and gave origin to the book of the same name", he explained.

For Luiz Marcelo Tegon, Ciber Executive Director at Ciber, to take part in a project like this one was an honor for the company. "The Brazilian army has a great contribution to the development of the country and knowing that Ciber had the opportunity to get involved both supplying equipment that helped in the construction of the road infrastructure of the country, as well as now, in the consolidation of this book, is something highly important and a reason for all of us to be proud at Ciber", he says.

According to Sergeant Marcio, this is not the first engineering book from the Army, but a more complete edition as compared to the previous ones. According to the team that conceived the collection, *A Engenharia do Exército na Construção do Desenvolvimento Nacional*, in addition to consisting of an important source of research for several knowledge areas, it is also an opportunity to pay a homage and thank the military engineers who made and are part of the history of the Brazilian Army Engineering.

Among the topics approached, the readers may find, in addition to the origin of the creation and evolution of the *Arma de Engenharia*, stories about difficulties and atypical situations in the execution of the main work and services in different times, from the Southern region to the Amazon. Such as, for example, reports about Transamazônica construction, the implementation of the BR-307, revitalization and conformation of the margins of São Francisco river in Bahia, implementation of stretches on the BR-163 in Mato Grosso and the participation in the *SOS Rodovias* program in Santa Catarina, among many others.

The authors Cap. Emerson Rogério de Oliveira, Cap. José Narciso Santana and Cap. Edmar César



However, the Army Engineering does not live on road maintenance and construction only. The corporation has also been responsible for the construction of bridges, railroads, ducts, wheel perforations, house building, schools, medical units, and hospitals. There are excerpts in the book reporting the interference of the army as an intermediate agent in the resolution of conflicts at certain locations.

Gen. Joaquim Maia Brandão Júnior handing the book to the widow of Cel. Washington Machado de Figueiredo

BOOK SIGNING

To promote the book, the Department of Engineering and Construction (DEC) held a book signing event of the collection with the presence of several authorities. During the event, a homage was made to Cel. Figueiredo, one of the organizers and writers of the book who passed away on February 3, two weeks before the book was launched, in which his efforts and competencies were celebrated, as well as his love for engineering. "An engineering military agent, and passionate about the field, Cel. Figueiredo was one of the great enthusiasts of the project", said Sergeant Márcio Pereira da Silva.

A Engenharia do Exército na Construção do Desenvolvimento Nacional is available only through free download on the site www.livrodeengenharia.com.br. ■

Picture: Ronaldo Bernardes

EDUCATIONAL PROGRAM “FUN TRAFFIC”

AWARENESS PROJECT HAS ALREADY GUIDED OVER 7 THOUSAND STUDENTS AND TEACHERS IN THE PUBLIC EDUCATION SYSTEM

Traffic accidents are a reason of concern for many parents that think about the safety of their children, either when going to school, going home, or going out with friends. To guide and warn the children about the danger and recklessness caused by drivers and pedestrians on public roads, Ciência Divertida – a leading company in interactive scientific activities targeting children from 4 to 17 – produces and presents the show Trânsito Legal (Fun Traffic) in schools of the public education system in Rio Grande do Sul and Rio de Janeiro with the sponsorship by Ciber Equipamentos Rodoviários.

To approach the topic, since 2013 several interactive activities are promoted with the students, aiming at raising awareness in a playful way through school competition, drama plays, and knowledge tests of the course, giving them the chance to get the Carteirinha de Motorista Mirim (Children driver’s license). Everything is done in a fun and informative way, based on the motto of the project: “You never forget something you learn laughing and playing”.

In a partnership between Ciber and the Ministry of Culture, the project has already been presented to over 20 schools in the public education system in the cities of Tanguá (RJ), Itaboraí (RJ) and Porto Alegre (RS), with a total of 50 presentations. The total number of children who participated was 7,621 in the age groups from 6 to 12 and 271 teachers of the city and state public educational systems of the cities. The project, in partnership with Ciber, is at full expansion and in 2015 will encompass other regions and schools in the country.

Luiz Marcelo Tegon, President of Ciber Equipamentos Rodoviários, highlighted the importance of approaching the topic with the young population, future drivers: “Our intention in developing the project is thought to teaching and bringing awareness to the future drivers and the way they can take information with them and share important information with their friends and their parents at home”, he explained. ■

WIRTGEN GROUP PEÇAS ORIGINAIS

CIBER KNOW WHICH NONSTICK SOLUTION SHOULD BE USED ON COMPACTING ROLLERS TIRES

A nonstick solution for tires is applied to avoid adhesion of asphalt mass to tires during compaction process with combined or static rollers.

Diesel oil and compounds of mineral origin (obtained from oil) are frequently used as nonstick solutions inappropriately. It is not recommended to apply those as nonstick solution for compacting roller tires because they harm the environment, dilute the recently laid asphalt mass, and damage the tires.

There are products in the market whose formulas contain components that are aggressive to rubber. The use of such elements, combined with the high temperature of asphalt at the moment of compaction – 120°C to 170°C – cause damage to the tires rubber and speed up their wear.

Pictures: Banco de Dados Ciber

Above, tires damaged on the edges due to the use of hydrocarbons (obtained from oil); in the middle, formation of bubbles, cracks and drying of the tires due to the use of mineral oils, worsened by the high temperature of asphalt; and to the right, segregation and dilution of the asphalt mass after the contact with mineral oils.

Pictures: Banco de Dados Ciber

The Wirtgen Group has a sustainable nonstick solution for tires that takes in consideration the environmental impact and work safety because they do not have solvents that hurt the skin and they do not react with plastic, rubber, electric sensors, electronic plates, or metallic surfaces of the equipment. Made of a mix of vegetable additives that are atoxic and biodegradable combined with anticorrosive additives, which are essential characteristics for a nonstick solution of high quality.

In addition, it also protects, lubricates and avoids the drying of the tires, increasing the useful life and ensuring a higher quality finishing in the paving.

Application

The nonstick solution for tires is supplied in concentrate and it is used diluted in water, concentration might vary according to the type of asphalt.

Its application is done through spraying on the tires of compacting rollers and it should be done through the spraying system of the machine.

Advantages

- Liquid product with low viscosity. Odorless and soluble in water.
- Easy application through the spreader of the equipment.
- Made with biodegradable product and not listed as hazardous substance in road transportation regulations.
- It replaces the use of organic solvents that affect the asphalt surface, in addition to preventing the hazardous components to be released into the environment.

On the side, tires in a perfect state of conservation, thanks to the correct use of Nonstick Solution by Wirtgen Group, a product tested and approved all over Brazil.

To obtain maximum tires durability and performance, we recommend the use of the product also for cleaning the tires.

How to use it

- In the case of Hot Mix Asphalt (HMA) (conventional), the proportion used is between 1:5 and 1:10 (15% to 9%, approximately).
- For HMA with rubber, the proportion is from 1:2 to 1:4 (30% to 20% approximately).
- For HMA with polymer, the proportion is from 1:2 to 1:4 (30% to 20% approximately).
- For binding agent and Hot Pre-Mixed, the proportion is from 1:2 to 1:3 (30% to 25% approximately).

Other applications

As nonstick solution in the transportation of masses in dump trucks, the proportion is 1:5 to 1:10 (15% to 9%, approximately).

Important

The efficiency and output depend on the aggregate particle size. For aggregates that have a larger particle size they proportion will be the smallest possible, ensuring a more diluted product. In the cases in which particle size is small, there is a need of a larger amount of product, which requires a higher concentration.

The nonstick solution is offered in 5 or 20-liter volumes and is available in all Wirtgen Group dealerships.