USINA
DE NOTÍCIAS

WIRTGEN | VÖGELE | HAMM | KLEEMANN | CIBER

ROAD AND MINERAL TECHNOLOGIES FROM THE WIRTGEN GROUP

Maintenance of Machinery and Equipments

Experts compare cutting tools

Recyclers reduce time of stabilization

Sustainable technology for warm foamed asphalt

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Editorial

STRATEGY facing adverse market scenarios

Both in Brazil and in Latin America in general, decreasing results of Infrastructure investments in the years of 2015 and 2016 have affected the whole construction equipment sector, particularly the road sector. The brazilian industry of equipment had a 58% fall in 2015 compared to the previous year. In 2016, however, the fall is even more significant, at 64% over the volume of 2015.

Facing this scenario, and in the opposite direction of many companies, at Ciber Equipamentos Rodoviários, a Wirtgen Group company, we continue advancing our participation in Brazil, expanding operations into new markets and investing heavily in innovation, research and development. We have maintained a participation in the order of about 1/3 of the total sales of the machinery sector for road maintenance and construction in Brazil, with absolute leadership in the milling and recycling segments, with participation of over 90%. We may highlight the constant improvement of our distribution network, after sales, technical teams, strong investments in R&D and innovations in our product portfolio as success factors. We want to be always ahead offering new technologies and solutions to our customers, even in times of crisis. After the hard times, we will certainly have a portfolio of even more innovative products and services to meet all demands.

Even in the current economic scenario, at Ciber and in the Wirtgen Group, by strategic decision, we have advanced and incremented the investments even further.

In R&D, we have invested 25% more in 2015 than in the previous year, and 21% in fixed assets. In addition to strong investments in the qualification of all sales force and in new subsidiaries, such as Wirtgen Brasil Rio de Janeiro and, more recently, Wirtgen Brasil São Paulo.

Our Ciber asphalt plants have been a major growth driver for the company. With over 1,800 asphalt plants sold since Ciber's foundation, and with operations in four continents, the brand is already strongly established in all Latin American countries and has gained more strength in markets in Africa, Southeast Asia, Australia and New Zealand.

Continuing the investments and innovations process, we launch what will be the onset of a new era in mobile asphalt plants: the iNOVA 2000 — a plant with a production capacity of 200 t/hour mounted on only two chassis with high mobility and maximum production.

As stated in the present issue and in announcements previously sent, we are investing heavily in the modernization of the entire visual identity of the Wirtgen Group and in our product brands. The goal is to present ourselves to the world in an even more unified way.

We also highlight, in this issue, an article that reflects the different business opportunities that involve the production of aggregates, for either highway construction or civil construction, and the growing opportunities producing aggregates derived from civil construction waste and debris. New technologies incorporated in job sites inside and outside Brazil are also the focus of many builders and contractors to meet the demands of different markets, including issues related to sustainability. Information regarding equipment maintenance and cutting tools, the importance of teams training and the dissemination of new technologies and applications are more examples of constant initiatives that should be pursued and maintained, even in adverse times.

Since 1978, the knowledge by Ciber has reached our customers and partners through our own specialized publications in our area of operation. At that time, we started to share information with about 700 customers in Brazil. Several publication formats have been used in the past decades and since the year 2000, already as ***Usina de Notícias****, we have had a large-scale publication, printed in three languages and distributed to over 8,000 customers in four continents.*

It means 38 years, over 1,600 pages of content and more than 140,000 printed copies distributed with the aim of bringing to you consistent information about equipment, technologies, reports from job sites and from thousands of customers, from the entire Latin America, Africa, Southeast Asia, and Oceania continents.

As we are inspired and motivated to innovate, in a process of world standardization of the Wirtgen Group, starting in 2017 we will start sending you the magazine ***Road News****, which will replace Usina de Notícias; it has already been distributed in the Northern Hemisphere markets for many years.*

With the magazine, full of new features, you will have access not only to information about the markets already covered by Usina de Notícias, but also to the best practices, news on equipment, technologies, and the most varied cases of application with customers and projects, all over the world.

We will continue to be close to you, investing and innovating in equipment and customized solutions; because this is the way we believe growth can be continuous and prosperous.

We hope you enjoy reading this last issue of Usina de Notícias, and that all content and information here may inspire you even further in the growth of your business.

Luiz Marcelo Tegon
CEO, Ciber Equipamentos Rodoviários

"Even with the current economic scenario, Ciber and the Wirtgen Group, by a strategic decision, have advanced and continuously increased investments."

Experts

compare cutting tools - picks - to prove the highest service life and cost-benefit ratio

General equipment conditions, the job site, and the material used should be supervised to increase the process efficiency

To ensure a longer service life to the picks installed on a piece of equipment and, hence, a better cost-benefit relation, technicians constantly perform comparative tests of the cutting tools. In order to make the process of evaluation of different picks more efficient, some points such as supervision of job site and equipment conditions, as well as the process of installation and implementation should be taken into consideration so that the comparison is not influenced by any factors.

Supervision

Supervision is indispensable to ensure that all criteria are followed and the data are collected to complete the comparison. Just as important as supervising, installing and applying comparable picks together at the same time on the same machine and the same work, that is, with equal conditions for both tested picks. The milling or recycling drum should also be evaluated.

EVALIATION of the job site conditions

Equity of circumstances for the work where the test is performed also gains importance because the tools may have a different wear due to metal reinforcements on the pavement, manhole covers, cobblestones below the surface of the pavement layer, among other conditions of the material be milled or recycled.

As an external factor influencing the comparison, the ambient temperature of where the work is performed must also be observed by those who perform the test. For example, a cut done in the winter at a temperature of 10°C cannot be compared to a cut in the summer, at a temperature of 32°C.

Metal reinforcements on the pavement

Manhole covers

Cobblestone

Pavement to be milled

Once the conditions of picks to be tested are evaluated, as well as the material to be milled or recycled and the temperature, attention should be given to the installation of picks. For a process used in the same equipment, there are two means of assembly, half-and-half and spirals.

Picks installation

In half-and-half assembly, the advantage is on the simplicity to assemble, monitor, and evaluate. However, it should be taken into consideration that the cutting rings picks must be evaluated separately, and if the machine not always works at the full milling or recycling width, part of the picks not perform the same job. The advantage of spiral assembly consists on the fact that it is the simplest method for measuring carbide tip wear. In this case, it is not necessary to change the picks before reaching such a state. The disadvantage is in testing in milling machines, since the difference in length between the tools influences the quality of the cut.

1. Half-and-half assembly

Bits kind A Bits kind B

2. Spirals assembly

Bits kind A Bits kind B Bits kind C

EVALIATION of the Equipment state

A phase prior to assembly, the evaluation of the equipment state is key. Brackets in bad conditions frequently result in problems in the rotating behavior of the picks, which then influence tools wear. Therefore, brackets in different conservation states may influence the result of the test negatively. Likewise, the state of the ejectors should also be previously diagnosed, as bad conditions maintain the material in contact with the picks in the ejection zone for longer, which results in increased wear of the pick.

Ejector Brackets Conditions

Ejectors Conditions

EXECUTION of the wear evaluation test

Regarding the test run itself, the measurement of the length of the picks before the assembly, the installation according to the method used, and the visual assessment of tool wear at the end of each working day are essential. Still on wear, the lack of uniformity and rotation problems are the main indicators.

A new measurement of the length of the tools and the calculation of the projected useful life based on the hard metal wear help technicians to consider the cost-benefit from the comparison.

The picks assembled on the cutting ring suffer different forces than the other drum picks. Based on this, the wear assessment should be performed separately.

Cutting ring area (highlight in red)

Another important point in wear analysis is the decision about which tools are in conditions for length measurement. Tool with rotation issues have concentration of wear on only one side, and may negatively influence the tests results.

Example: to the left, a pick with rotation problem to the right, a pick with perfect rotation.

Images: Banco de Dados Ciber

COMPARATIVE TESTS BETWEEN WIRTGEN PICKS VERSUS NON-ORIGINAL PICKS

Comparative asphalt recycling and milling tests using Wirtgen picks and non-original picks carried out in Brazil.

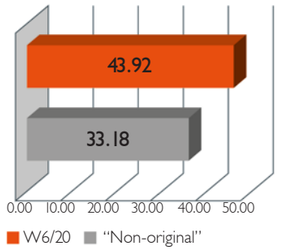
1

Job site information:

Location: Feira de Santana/BA
Date: May 7-9, 2013.

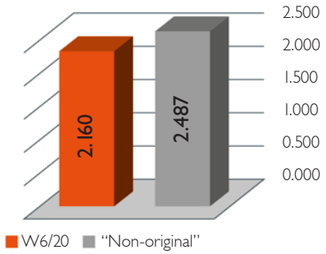
Machine: Milling Machine / W200
Milling drum width: 2,000mm
Cutting depth: 8cm
Toolholder system: HT11 /144 parts
Material to be milled: Asphalt
Material properties: Hot Milled Asphalt Concrete – Asphalt over a base of cobblestone and rocks*

Picks service life (in hours):



Result: 32% longer service life of the W6/20 pick in comparison to the non-original equivalent pick

Cost per pick (in R$ per m³):



Result: Lower total cost of more than 13% of Wirtgen bits as compared to the equivalent non-original

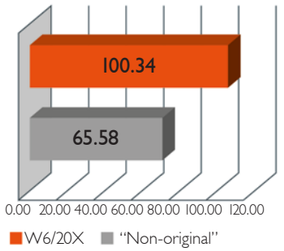
2

Job site information:

Location: Inhumas/GO
Date: June 25-27, 2014

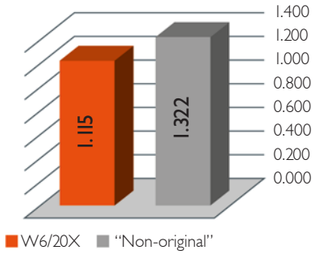
Machine: Milling Machine / W 100F
Milling drum width: 1,000mm
Cutting depth: 6cm
Toolholder system: HT11 / 99 parts
Material to be milled: Asphalt
Material properties: Hot milled asphalt concrete*

Picks service life (in hours):



Result: 53% longer service life of the W6/20X pick in comparison to the non-original equivalent pick

Cost per pick (in R$ per m³):



Result: Lower total cost of more than 16% of Wirtgen bits as compared to the equivalent non-original

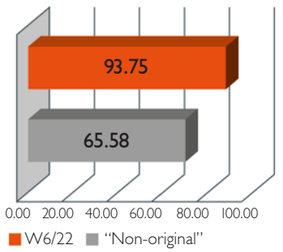
3

Job site information:

Location: Avaré/SP
Date: August 11-15, 2015

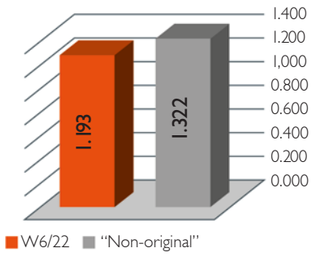
Machine: Recycler / WR240
Milling drum width: 2,400mm
Cutting depth: 22cm
Toolholder system: HT11 / 146 parts
Material used: Asphalt, crushed stone, earth, and cement
Material properties: Deteriorated asphalt layer over cement-soil base with aggregates*

Picks service life (in hours):



Result: 43% longer service life of the W6/22 pick in comparison to the non-original equivalent pick

Cost per pick (in R$ per m³):



Result: Lower total cost of more than 10% of Wirtgen bits as compared to the equivalent non-original

* Conditions of job sites vary according to the material.

Images: Banco de Dados Ciber

ORIGINAL WIRTGEN PICKS GENERATION X
Characteristics, advantages, differentials

Only original Wirtgen picks ensure maximum performance at the lowest cost per m3 of production.

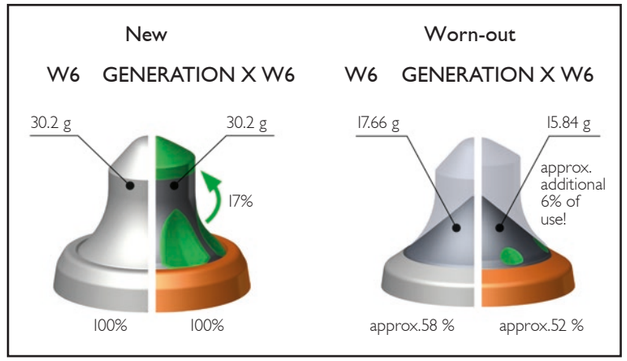
Characteristic:

The new design of the tip in the Generation X model has been optimized with:

- 17% more material in the attack zone.

Advantages and Benefits:

- Maximum material use;
- Better penetration for extended time.



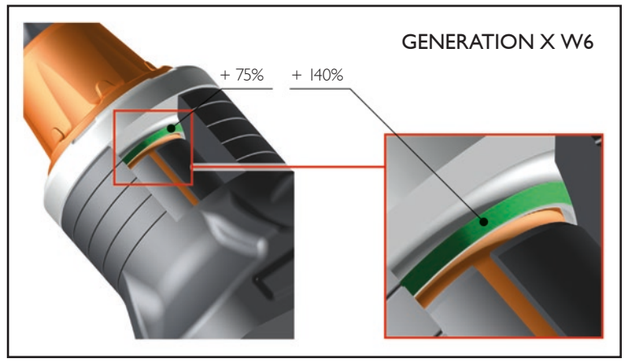
Characteristic:

The protection washer is even more robust and functional:

- 75% thicker;
- 140% more contact area with enlarged lower chamfer.

Advantages and Benefits:

- Perfect centralization = less material inlet in the bracket hole = pick rotation guarantee;
- Protected bracket = reduction of maintenance costs.



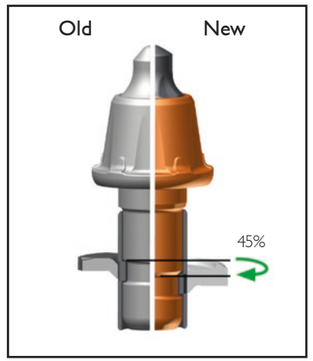
Characteristic:

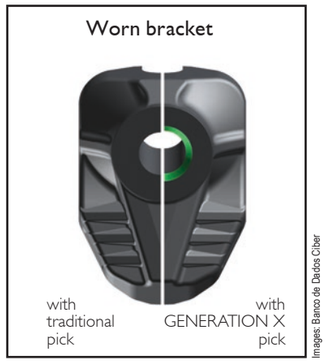
The positioning of the stop collars in the Twin-Stop clamping sleeve has been improved:

- 45% less chances of shaft fractures.

Advantages and Benefits:

- Strict control of circularity = less friction in the bracket hole = pick rotation guarantee;
- Protected bracket = reduction of maintenance costs





Images: Banco de Dados Ciber

- When choosing, just comparing the unit price of a Wirtgen pick and another brand is not enough. It is fundamental to take into account the service life of picks.
- Wirtgen picks last up to 53% more, result in up to 50% less replacements, thus conferring a real economy of over 10% in the total cost per m³.

Teeming with innovations

Up front with leading-edge technology: SUPER 1800-3i SprayJet, the Generation 3 paver for spraying as well as for standard paving jobs.

Unequalled – Highlights of the SUPER 1800-3i SprayJet

- World's only spray paver for paving thin overlay as well as conventional surface and binder courses
- Incorporates all the advantages of the Generation 3 paver
- Modular operating panel integrated into the ErgoPlus 3 operating concept
- Ultramodern ErgoPlus 3 operating concept for paver and spray module
- AutoSet Plus automatic functions for rapid relocation of the machine on the job site and storage of paving programs
- Electrically heated tank for bitumen emulsion (2,100 litres as standard, can be increased to 7,100 litres with optional extra tank)
- Emulsion sprayed at a rate of 0.3 to 1.6kg/m² in a clean and controlled process

The SUPER 1800-3i SprayJet is an efficient all-rounder that handles spraying and standard paving jobs with equal ease. This newly developed paver is bursting with impressive innovations, particularly when it comes to the SprayJet module, the spray technology and the operating concept. The development work focused on cost-efficiency. Application of the emulsion is exceedingly precise and hence efficient, while the VÖGELE EcoPlus low-emissions package – another Generation 3 functionality – saves fuel and reduces emissions. The new automatic AutoSet Plus functions are particularly practical in the paving process, for they store current machine data such as pave width and screed settings. As a result, work can resume rapidly following a break in paving or after relocating the machine on the job site.

Cost-effective surface course rehabilitation for a competitive edge

Paving thin asphalt overlay "hot on hot" on spray seal (DSH-V) is an established process in many markets and a low-cost method for rehabilitating or renewing surface courses, as it saves costly surface course material. VÖGELE have not only set standards here with their SprayJet technology, but have raised the bar again by launching their new SUPER 1800-3i SprayJet.

Tough design, strong performance

KLEEMANN presents the new Mobicone MCO 11 PRO for use in quarries

Kleemann has launched its first model in the new generation of cone crushers for use in quarries: Mobicone 11 PRO.

The development work focused on high performance and a robust design, excellent transportability, easy access for maintenance, plus maximum occupational safety. As a result, the MCO 11 PRO is optimally equipped to stand up to the rough environment of natural stone quarrying.

Easy access to maintenance, with a low gravity center

The MCO 11 PRO is designed for a high level of user-friendliness. The power unit is now located under the feed unit – a completely new feature in this machine class. All maintenance points can be accessed from ground level, making servicing a great deal easier and increasing occupational safety, too. The resultant low centre of gravity not only improves the machine's overall balance, but also reduces the level of noise and vibrations. The large, lightweight hoods reliably protect all technically sensitive points without restricting access when servicing is required.

Powerful, low-consumption diesel-electric drive

The MCO 11 PRO comes with a powerful diesel-electric drive unit. It boasts a particularly low consumption and can also be operated with power supplied from an external source. Spacious working platforms ensure safe access for maintenance. The fuel and AdBlue®/DEF tanks are refilled at a comfortable height from ground level. A Continuous Feed System (CFS) ensures uninterrupted crusher feed and optimum utilization of machine capacity. In this way, the MCO 11 PRO can handle feed quantities up to 470t/h.

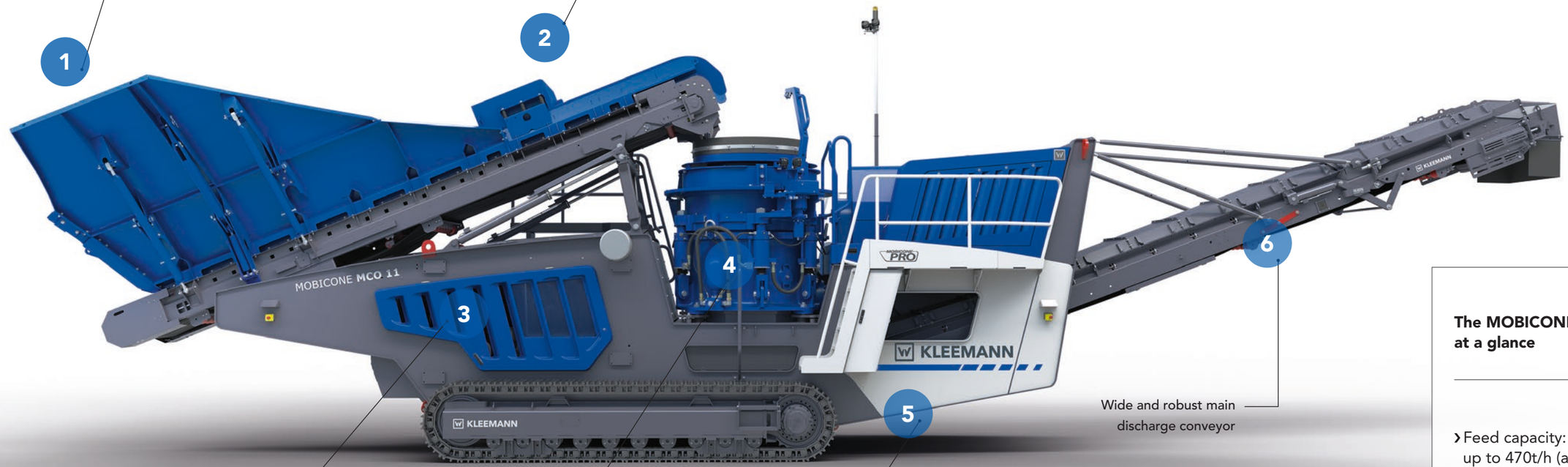
Easy to transport, quickly set up

For natural stone processing in quarries, the transportability of crushing plants is playing an ever greater role. Transport costs are consequently becoming an increasingly significant cost factor. The transport dimensions of the MOBICONE MCO 11 PRO are ideal. Nothing needs to be dismantled for transport. Even when equipped with the full complement of options, the MCO 11 PRO is ready for use within 30 minutes, due to its hydraulic fold-up functions.

MOBICONE MCO 11 PRO cone crusher: Impressive highlights

New KLEEMANN PRO series

When they launched their EVO generation, KLEEMANN introduced crushers for the contractor market which boasted a uniform operating concept, due to coupled plants and, of course, higher productivity and cost-efficiency. The innovative manufacturer of mobile crushers and screens has now gone one step further with introduction of the PRO generation. These machines are designed to meet the requirements of quarry operators and achieve high performance levels. The PRO series stands for new development of all plant components, in other words, for real progress. The first model in the new series is the mobile MOBICONE MCO 11 PRO cone crusher.



1 Short set-up times due to simple slide mechanism in the feed unit

2 CFS (Continuous Feed System) ensures optimum loading of the crusher

3 Low consumption due to the robust and powerful diesel electric drive

4 Cone crusher with great stroke length for maximum crushing capacity

5 Simple and intuitive control through a 12" touch panel

6 Wide and robust main discharge conveyor

7 Convenient automatic adjustment of the crushing gap via touch panel

8 Transportation is facilitated and ensured by hydraulically folding belts

9 Safety and ergonomics ensured by machine design.

The MOBICONE MCO 11 PRO at a glance

- Feed capacity: up to 470t/h (approx.)
- Maximum feed size: 250mm
- Crusher inlet: 1,100mm in diameter
- Drive concept: diesel-electric
- Power rating (Stage IIIA/Tier 3): 371kW
- Transport weight: 48t (approx.)

Excellence in Asphalt Production

CIBER iNOVA 2000

The new model breaks paradigms when it comes to mobile asphalt plants

More than manufacturing and providing equipment, it is necessary to present technical solutions for each application. In each construction step, choosing the right equipment ensures productivity and overall quality of work. Technological innovations add even more efficiency and security, walking side by side with new techniques for civil engineering, which are continuously developed to maintain and build roads faster, at lower costs and higher quality.

With 58 years' experience in manufacturing paving equipment's, Ciber Equipamentos Rodoviários, a Wirtgen Group company, operates in all Latin America countries, Africa, Oceania and Southeast Asia. Ciber is a reference in technology and equipment for the production of asphalt mixes, having already produced and delivered to job fields more than 1.800 plants in four continents, incontestable proof of the Ciber know-how on asphalt plants.

Ciber, supported by its experience and after intensive research on components and requirements of different asphalt mixes, developed a revolutionary plant that adapts completely to the inputs and outputs. Before that, a particular plant productivity was achieved according to the characteristics of the inputs and the final product. With the new Ciber iNOVA® 2000 maximum productivity has become a constant, regardless of the characteristics of inputs and requirements of the asphalt mix.

Innovations

iNOVA® 2000 introduces 5 major highlights which, either individually or altogether, innovate and break paradigms in terms of mobile asphalt plants for continuous production flow. Some of the highlights include production capacity in two mobilities; efficiency in fuel consumption; maximum performance in special mixes; ease of operation and optimized maintenance.

THE HIGHEST PRODUCTION CAPACITY IN JUST TWO MOBILITIES

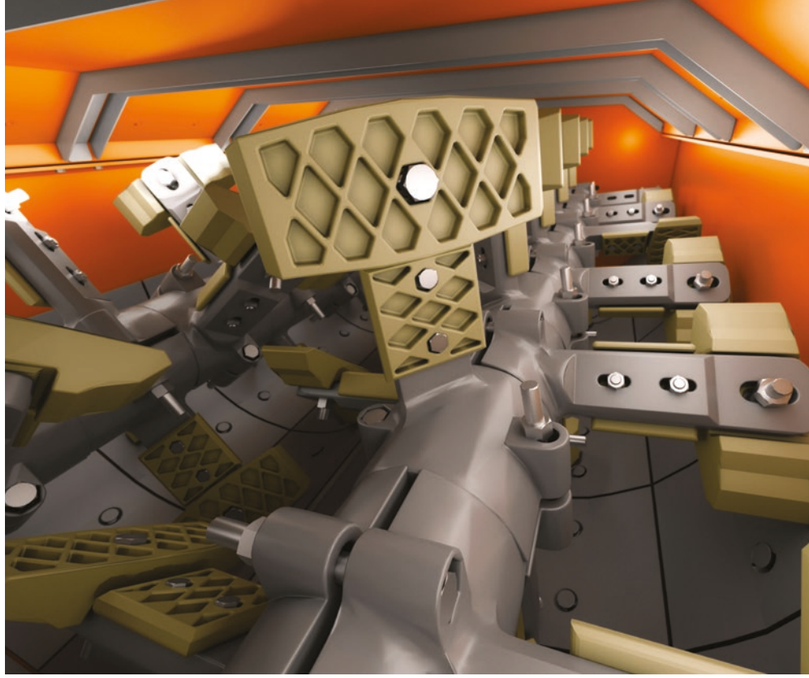
iNOVA® 2000 combines the concept of ultra mobile plant with high production capacity. The plant is transported and installed in two chassis and output ranges between 100 to 200 t/h. Thus, land and sea transport costs are significantly lower as well as installation costs compared to plants of the same production size. Also, the plant adapts to most construction sites and presents a less complex install procedure.

EFFICIENCY IN FUEL CONSUMPTION

Unique technologies have been developed for the purpose of minimizing the energy consumption required for drying aggregates. The first technology is the aggregate drying time control through the variation of the dryer drum rotating speed. This technology provides the exact drying time required for each type of aggregate, always resulting in lower fuel consumption. The second difference is the automatic control technology for gas flow required for combustion from a closed-loop system. Thus, the exhaust will only provide the necessary air for burning, reducing energy consumption and ensuring perfect combustion, reducing fuel consumption. The Ciber's Total Air burner ensures that only the air required for the combustion is heated in the drum, also resulting in lower fuel consumption.

HIGH PERFORMANCE SPECIAL MIXES

One of the major challenges faced in the equipment design was to create a plant capable to ensure maximum heat exchange between the burner and the aggregate regardless of the type of aggregate and asphalt mix produced. The engagement between the drying time required on a size curve of the aggregates and drying time in the plant constantly provides the maximum thermal efficiency. With the iNOVA® 2000, efficiency is constant considering traditional dense mixes and special mixes such as SMA or GAP GRADED. Another feature is the external pug mill mixer with dry mixing stage, essential for the occurrence of a pre-homogenization of the aggregates before the injection of the asphalt cement, important requirement for dense mixes and essential for the production of SMA mixes requiring addition of cellulose fibers. You can also vary the aggregate mixing time according to aggregate and asphalt mix requirements. For example, a project with aggregates that do not have good adhesiveness with the Bitumen can stay longer mixing.



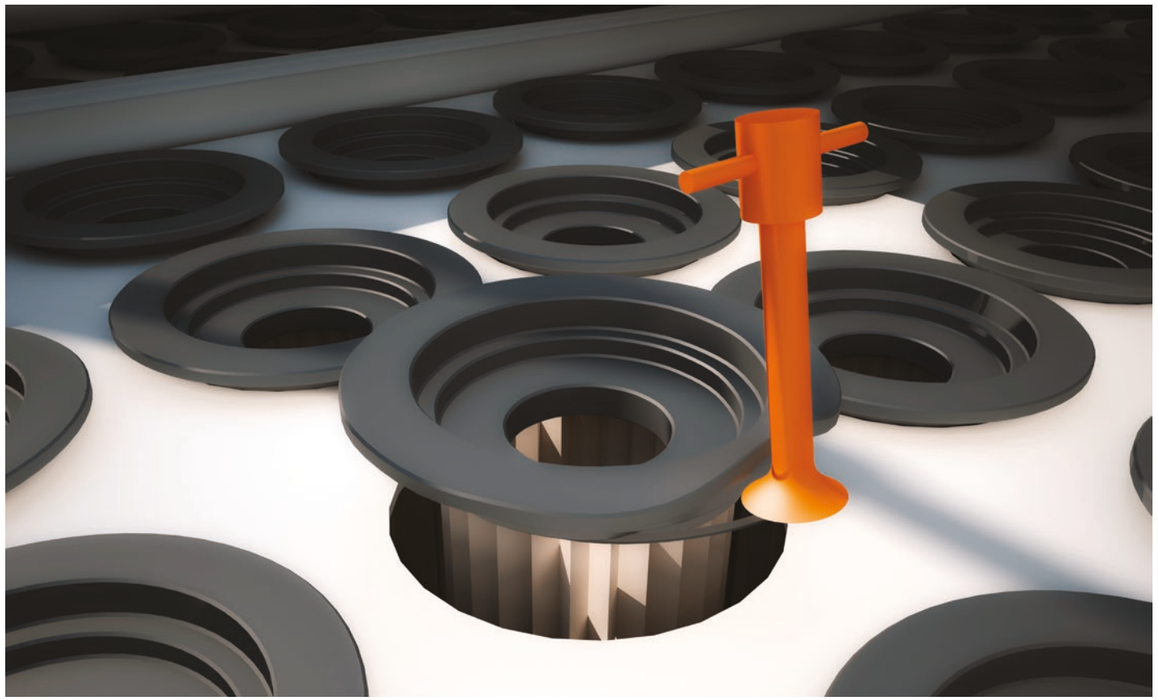
EASE OF OPERATION

Ciber plants have always been at the forefront of automation systems, featuring industrial computers with adequate strength to the work environment, operating screen with touch screen interface and digital data transmission systems (network). In addition to these technologies, iNOVA® 2000 introduces the new EasyControl® system, which makes operation much more intuitive. Auto production occurs with total management of production activities by the plant computer, including automatic variation of the flame intensity according to aggregate heating.

OPTIMIZED MAINTENANCE

Technology should be aligned with the robustness of the plant. With that in mind, the main wear components are designed to last and, when necessary, provide accessibility for maintenance. Mixer blades, for example, have special geometry that reduces the impact of aggregates with the metal structure. Also, high abrasion resistance materials were applied, reducing maintenance downtime and increasing productivity of the plant. Systems already established as the EasySpin® tool for rapid exchange of the sleeves also reduce maintenance time and the innovative fault diagnosis system detect potential failures accurately, significantly increasing the response time for any unplanned maintenance and enable resuming production in a shorter period of time.

For more information, please contact *ciber@ciber.com.br*



Recicling and paving
are topics of discussions in Seminars all over Brazil

Debates took place in Goiânia, Brasília, Manaus, Ilha Solteira and São Paulo

BRAZIL

With the goal of debating and disseminating the technological advances in the road construction sector, engineers and engineering students attend to workshops promoted by Ciber and its dealers throughout Brazil. In order to serve this public and other professionals in the sector, Ciber has been promoting seminars focused on recycling and paving for the past few years in cities such as Goiânia, Manaus, Brasília, Ilha Solteira and São Paulo. In a continuous process of discussions, topics such as “Products and applications in paving“, “Techniques and Equipment for Soil Stabilization and Asphalt Recycling“, “Technologies and Applications in Paving“, and “Asphalt recycling methods“ have been approached.

One of these workshops, held in Goiânia in the auditorium of Agetop (Agência Goiana de Transportes e Obras), had “Products and Applications in Paving“ as the main theme and it was mediated by the engineer and Ciber product specialist Marcelo Zubaran. The debates also featured presentations by Agetop engineers, contractors in the region, and undergraduate and graduate students who had the chance to learn more about some of the major cold recycling techniques using Wirtgen recyclers and application of different types of base and subbase structures. Moreover, the participants learned about compression of structural layers, production of hot asphalt mixes in the plant, and characteristics of materials used in asphalt mixes.

The topic “Products and Applications in Paving“ has also been approached in an seminar the XXXIV Semana da Engenharia Civil (Civil Engineering Week) by Marcelo Zubaran, at the Unesp (Universi-dade Estadual Paulista) auditorium, located at the Ilha Solteira campus (SP). The audience consisted of undergraduate and graduate students from Unesp University.

“It is important to be present at events such as the XXXIV Semana da Engenharia Civil because this is an opportunity to share with the participants the latest technologies and applications available on the market today, which are the expertise of the Wirtgen Group and Ciber. The topic presented by Ciber approached successful cases in paving works“, explained Zubaran.

In Manaus, with the support of Deltamaq, the Wirtgen Group dealer in the region, there were debates about recycling. There were two technical events in the auditorium of the Military Command of the Amazon on “Techniques and Equipment for soil stabilization and asphalt recycling,“ with Martin Diekmann, product manager of Wirtgen asphalt recyclers, and “Paving technologies and applications“ with Juliano Gewehr, Ciber product specialist and application engineer. The topics approached emphasized soil stabilization techniques to reinforce and increase carrying capacity, as well as asphalt recycling with reutilization of 100% of the existing material.

For Lt. Col. Cleber Machado Alvarez, logistics official of the 2nd Army Engineering Grouping, who attended this event, the seminar was very fruitful. “The contact and closeness we had with the Ciber team and the Wirtgen Group has yielded us a lot; together we managed to visit some of our works in progress and map opportunities. This support has brought us important technical gains“, Arruda explained. The military also said that the knowledge gained in the presentations and discussions was „primordial, even for the correct use and application of equipment and its potential”.

In Brasilia, as well as in Manaus, topics related to recycling were addressed, including “Asphalt Recycling Methods“, with Dr. Dave Collings, a consultant at Loudon International and a specialist in technical solutions development for asphalt recycling, in a partnership with Wirtgen. “Equipment and Technologies for Recycling“ was another topic discussed with the participation of Martin Diekmann. The event took place at Sinduscon and had the presence of the technical staff of several public agencies and local construction companies. Pavement recovery methodologies through recycling were presented, including the study of material, laboratory research, recycling project, execution with Wirtgen recyclers, with examples of applications in Brazil and worldwide.

Martin Diekmann, product manager of Wirtgen asphalt recyclers, explains about the equipment to participants of the seminar

2° Grupamento de Engenharia do Exército (Military Engineering Grouping) has also participated in the event

The contact and proximity we had with the Ciber team and the Wirtgen Group has yielded us a lot; together we managed to visit some of our current job sites and map opportunities. This support has brought us important technical gains.

Lieutenant Colonel Cleber Machado Arruda, Logistics Official, 2° Grupamento de Engenharia do Exército.

All seminars had demonstrations of Wirtgen Group equipment and specialists

LATIN AMERICA

In São Paulo, the techniques and technologies related to cold recycling were discussed in December at the event Latin America Cold Recycling Summit. With the presence of representatives of governments, dealerships, and construction companies, the meeting discussed the cost benefits and process sustainability, using as its main case the works carried out by Fremix Engineering and Trade on the SP-070, known as Ayrton Senna Highway. The engineers also had the opportunity to visit the construction site.

According to the commercial director of Wirtgen for Latin America, Andreas Marquardt, the choice of Latin America, especially the city of São Paulo for the event, successfully demonstrated new possibilities for customers and companies in the region. "Cold recycling saves on transportation, brings speed in the application, in addition to providing a much better base stabilization. We showed that our machines have the technology for this work and to bring a higher cost-benefit", he said.

The event also had the presence of the technical director Douglas Judd, from N3 TC, a South African company, who talked about cases and challenges in the construction of a highway that crosses the country and is one of the main local roads, with 415 km of extension. Other attractions were the materials for the use of the technique, the processes, and question and answer sessions.

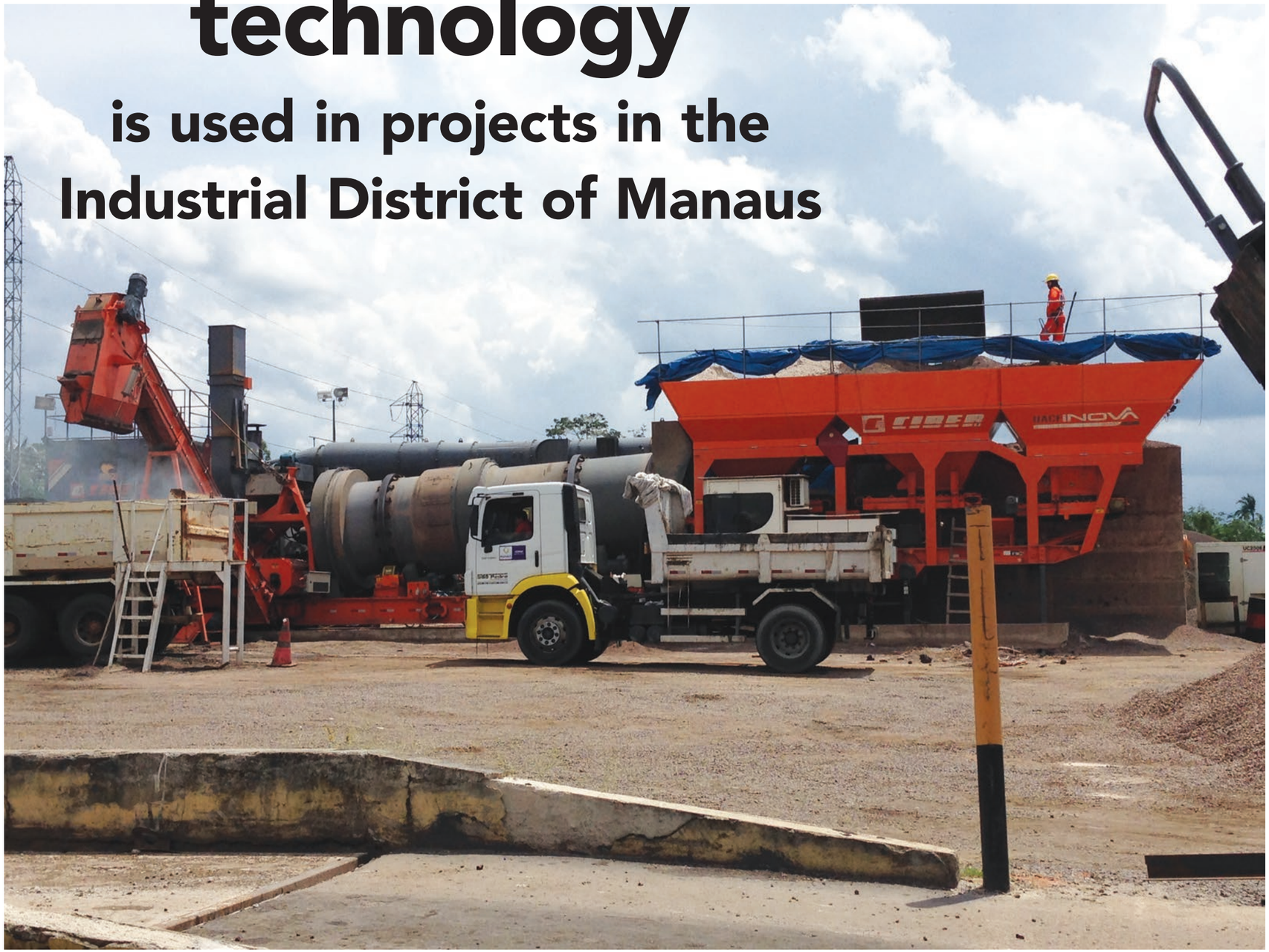
As well as in Brasília, Dave Collings was also present and spoke on the BSM (Bitumen Stabilized Material, an application that uses the foamed bitumen process), a technique with execution feasibility anywhere in the world with considerable advantages over traditional methods.

"All the knowledge gained in the presentations and debates was essential, even for the correct use and application of the equipment and its potentialities."

Lieutenant Colonel Cleber Machado Arruda, Logistics Official, 2° Grupamento de Engenharia do Exército

The warm mix asphalt sustainable technology is used in projects in the Industrial District of Manaus

The application proved to reduce costs and provide an excellent quality when producing asphalt mixtures for roads in Amazon's capital



The major challenge for the production and application of asphalt mixes on roads in Brazil is to achieve a good quality with sustainable appeal. During an unstable commercial moment in the sector characterized by an increase in the prices of inputs, including Bitumen, aggregates, fuel, and electricity, along with a low demand, it is essential to search for techniques aimed at costs reduction combined with good quality. Therefore, Ardo Construtora e Pavimentação has been using the foamed warm asphalt technique in bus lanes projects and in the Industrial District of Manaus/AM.

With a promising future, the innovative application, still in its infancy in Brazil, was chosen for the projects carried out in the North and East zones, where thousands of trucks and buses travel daily, carrying inputs and raw material shipments. In the case of the bus lanes in the Amazonian capital, resurfacing was done. The initial contract of one year was renewed for one more year.

Based on temporarily reducing AR's viscosity, the warm mix asphalt technique makes it possible to reduce the production and compacting temperatures. The amount that the temperatures can be reduced depends on the intrinsic characteristics of the inputs. The project developed by Ardo allowed the reduction of up to 40 °C for the production and compacting temperatures. For José Otemar Barroso Nascimento, technical director of Ardo, one of the major gains was clear: "We noticed reduction in gas emissions during production and compaction proportionally to temperature reduction, which improves the occupational health of workers".

Using the iNOVA 1200 plant, the company was able to produce in 2014 about 50,000 metric tons throughout the year. Nascimento also mentioned that they had an important fuel economy with Ciber's equipment: "We saw significant reduction in fuel consumption with Inova 1200, when compared to the conventional asphalt concrete production of the former plant, considering the same conditions of aggregates moisture".

In the Industrial District, two different services were performed: milling and resurfacing with warm mix asphalt. The asphalt mixture was designed according to the requirements of the Brazilian standard of DNIT - grade C. The AC content was 5.2%. Approximately 11,000 metric tons of warm mix asphalt were used for the 5 km of pavement.

We saw significant reduction in fuel consumption with the production of foamed warm mix, with Inova 1200, when compared to the conventional asphalt concrete production of the former plant, considering the same conditions of aggregates moisture.

José Otemar Barroso Nascimento, Technical Director, Ardo

According to Nascimento, the section was evaluated during and after paving and met all expectations. "During a pavement we did in 2014, we used the warm mix process and another company used the traditional process. Our work is still intact, and this other company has already performed three pothole repair operations on their part. Of course, we do not know the paving details done by this other company and if it complied with the standards required by the conventional application, but it still serves as a parameter," compares Nascimento.

Ardo's choice of iNOVA happened after the contractor decided to purchase a plant with an external mixer. During a road expo, the company saw the plant, newly released by Ciber at the time, and decided to buy it. "iNOVA's flexibility caught our attention. We saw that we could use it to produce foamed asphalt, which would give us a better production and compacting performance. We performed tests in our laboratories, compared it in the field and in the laboratory, and found that its compacting performance was a lot better," he said.

Besides in Manaus, using the iNOVA to produce warm mix asphalt has also been done in Boa Vista (RR), for the Carlos Pereira de Melo and General Ataíde Teive avenues. The projects were contracted by the State Government of Roraima, through NIT (National Department of Transportation Infrastructure) in Boa Vista.

TECHNICAL FEATURES

Name of the road: Rua Palmeira do Miriti - Industrial District of Manaus
Service performed: milling and resurfacing with HMA.
Extension: 5 km
Width: 13 m
Mass applied: 10,920.00 metric tons
Recipe: CBUQ LEVEL C DNIT

Composition of the mixture:
Gravel 1: 14.3 %
Gravel 0: 28.4 %
Sand: 23.7 %
Rock dust: 28.4 %
Bitumen: 5.2%

Physical and mechanical data of the mixture:
Diametrical tensile strength: 0.91 MPA
Percentage of space: 3.0 %
Percentage of Bitumen: 5.2%
Production temperature: 120 - 130 C
Compacting temperature: 100 C

Rental Market:
andine origin

For five years in Brazil, the chilean sk rental has built a relationship with over a thousand customers and now focuses on expansion

In Brazil, the trajectory began in 2010, with a company that had, at the time, a forklift, a compressor, a 15 meter articulated platform, a 12 meter scissor platform, one 20 KVA generator and the plan to be able to gain space in the Brazilian market. After five years, SK Rental, a company that belongs to the Sigdo Koppers group – a cluster with over 50 years of successful trajectory in Chile – is becoming one of the most reliable companies in the leasing of equipment and machinery for road and civil construction, as well as mining.

The origin of SK Rental comes from the name of Sigdo Kopers Group (SK) and the word rental in English. The company acts in three main areas: services – in engineering, construction and logistics; industrial – with explosives plants and mining products; and commercial – selling equipment, trucks and automobiles, in addition to equipment leasing. In the rental business, the group is present in four countries: Brazil, Chile, Peru and Colombia, and the business began in Chile in 1998. In 2010, the group decided to invest in Brazil believing in the huge potential of the rental business development, as well as in the significant infrastructure need the country still has.

The first Ciber equipment acquired by SK Rental was a 3411 Hamm roller. Today the group has more than a dozen units of Hamm rollers. The main works done by the company with the equipment were the following: construction of the new Klabin plant in Ortigueira; highway concession in Uberaba; doubling the Fibria plant in Três Lagoas (MS) and construction of the beltway in São Paulo.

The company operates in the lease of equipment for the industrial, construction, earthwork, paving and infrastructure areas. It has 1,453 customers and 45 employees in the Brazilian operation. It has a fleet of more than 4,500 industrial equipment for civil construction and for earthwork, which are constantly renewed in order to ensure productivity and provide a reliable and safe service.

SK is also concerned about the environment, working on the treatment and handling of waste, reducing the environmental impact. Hazardous waste is handled in accordance with applicable laws, authorized storage areas, and final disposal at locations that are authorized by the government. Recyclable waste, such as paper and metal, is saved and stored for this purpose.

According to Fábio Nardelli, managing director at SK Rental, the company still has a long way ahead of it. “Our group has long-term plans and in all markets we always seek to work with this view. We have been in Brazil for five years and we have a long way to go, such as the opening of new branches exploring new regions of the country, the development of new niche markets to expand our participation in projects, and the consolidation of our brand in country”, he said.

Fabio also spoke about the experience with the equipment and the difference of Ciber products in relation to the ones available in the market.

> **The purchase decision by Hamm rollers is because there is a good cost-effective relationship; these are products with excellent quality, a fundamental factor to a leasing company.**
>
> **Fábio Nardelli,**
> **managing director at SK Rental**

“The purchase decision by Hamm rollers is because there is a good cost-effective relationship; these are products with excellent quality, a fundamental factor to a leasing company. The 3411 rollers are very well accepted at the construction sites, are already established as a product and as a brand among the top construction companies the country”, Nardelli explained.

If we keep the same rhythm from the past few years, it is possible that SK Rental will follow the steps of its country of origin: continuous growth.

Machinery and Equipment Maintenance
Optimize your results!

The importance of your company to have a constant and efficient machinery and equipment maintenance plan can be translated into significant competitive advantage.

It is not a surprise that the business scenario becomes increasingly competitive, and this is not different in the construction market is no different. Investments in new technology, new equipment, new methods and applications are constant. In addition, there is the need for specialized workforce and increasingly more qualified and efficient services to ensure a good market position. Strategies are designed and planned all the time, as well as responses to the changes and needs of this market. New demands rise and new solutions are created, aiming at the good visibility of your company, and its continuation and growth in the market.

It is known, however, that to invest in new resources, many companies forget something very important that could be an advantage for the company and for the proper functioning of the product or service: following the maintenance plans recommended by manufacturers or establishing their own maintenance plan in order to ensure appreciation of their fleet of machinery and equipment.

WHY INVESTING IN MAINTENANCE?

Planning the maintenance of your fleet means to assume that, as important as investing in quality and technology of new machinery and equipment, is determining service fronts that track machinery and/or equipment, preventing the occurrence of problems or allowing for them to be mitigated in advance, with clear maintenance plans combined with expertise and staff training to diagnose and provide solutions when necessary.

As companies develop increasingly more sophisticated products, it is necessary to have a team that follows along this quality evolution. The maintenance area, much more than exclusively a sector for problem solving, should be seen as a source to optimize the use of resources, thinking from the perspective that the longer your machine or equipment is operating without breakage, the higher your financial and time-related results.

Currently, there are several tools and channels that can be used to optimize maintenance services. Talking about the machinery and equipment market, for example, there are tools that automatically open calls and, in addition to organizing and streamlining the services, provide the possibility to monitor and create historical records of maintenance and resolutions of problems, thus allowing an active database each machine's records. Those are some of the technical options that add quality and provide great possibilities for good management.

Having a maintenance structure with a team that inspires quality and trust, combined with other management practices, means to tell the market that your company does not only value the work itself, but the final quality of its execution, in the best conditions, time, within budget, and with efficiency.

MACHINERY AND EQUIPMENT MAINTENANCE

Machinery and equipment maintenance is important to ensure reliability and safety of equipment, improve the quality, and reduce production costs by avoiding waste. To prevent possible failure and breakage in equipment, the company must develop a preventive maintenance plan and launch this cost in production expenses allocation.

Corrective maintenance

It aims to restore or correct the operation of the machine and is carried out after breakage or failure happens. Corrective maintenance can be planned (when it is seen that the equipment is no longer working as it should) or unplanned (when it is performed after equipment breakdown). In general, unplanned corrective maintenance involves high costs and may generate losses in production and product quality.

Preventive maintenance

Preventive maintenance is associated with the creation of a maintenance plan, which, in turn, demands workforce planning, as well as input, and sometimes parts that must be available at the time of execution.

THE IMPORTANCE OF SPARE PARTS IN THE AREA OF MAINTENANCE

Currently, the market increasingly demands productivity and business efficiency, which requires a completely available industrial park working at full steam.

Given global competitiveness, companies, regardless of their size, cannot afford to shutdown their industrial park due to a single defective part, whether it is a screw or a sophisticated electronic component. Therefore, full support of the maintenance area is necessary, always considering the importance of spare parts availability.

Ciber Equipamentos Rodoviários, a company in the Wirtgen Group, has as one of its pillars, an outstanding after sales customer service, all the way from the technical service to a broad spare parts supply.

THE IMPORTANCE OF ALWAYS USING ORIGINAL PARTS

When managing fleets of any size, it is necessary to think about the equipment that integrates them as tools that need to be available for the job for the longest as possible to keep generating value for the company. However, what if any of the pieces of equipment presents defects? It is time for maintenance, using original parts, preferably.

Original parts fit better — After any piece breaks, it is necessary to replace it so that the machine continues to operate, right? However, only the original parts have the exact measurements because, in most cases, parallels are made from molds copied from the originals, at the risk of small deviations in the result.

That means that only original parts work together, in perfect harmony, with other components of the equipment. When using parallel parts, any small deviation can cause premature wear of the part, requiring a new replacement in a shorter time or even influencing the operation of other components. If you are manager, you know how much each day that a piece of equipment is in the shop costs, right?

Original parts last longer — At first glance, parallel parts may look similar to the original ones. However, it is important to remember that the material of which original parts are made is of higher quality and often times a larger area available for wear.

It is essential to bear in mind that each piece specified by the equipment manufacturer is tested to exhaustion in various conditions to ensure they last the longest time with maximum efficiency.

It is possible to say that hardly a parallel parts factory will be able to reproduce the composition of materials used in the manufacture of original parts exactly, which is crucial for durability - both the part's and the set's.

Original parts have higher warranty — Most of the new equipment will void the warranty if maintenance is done using non-original parts. Furthermore, original manufacturers generally offer longer guarantees than parallel parts manufacturers.

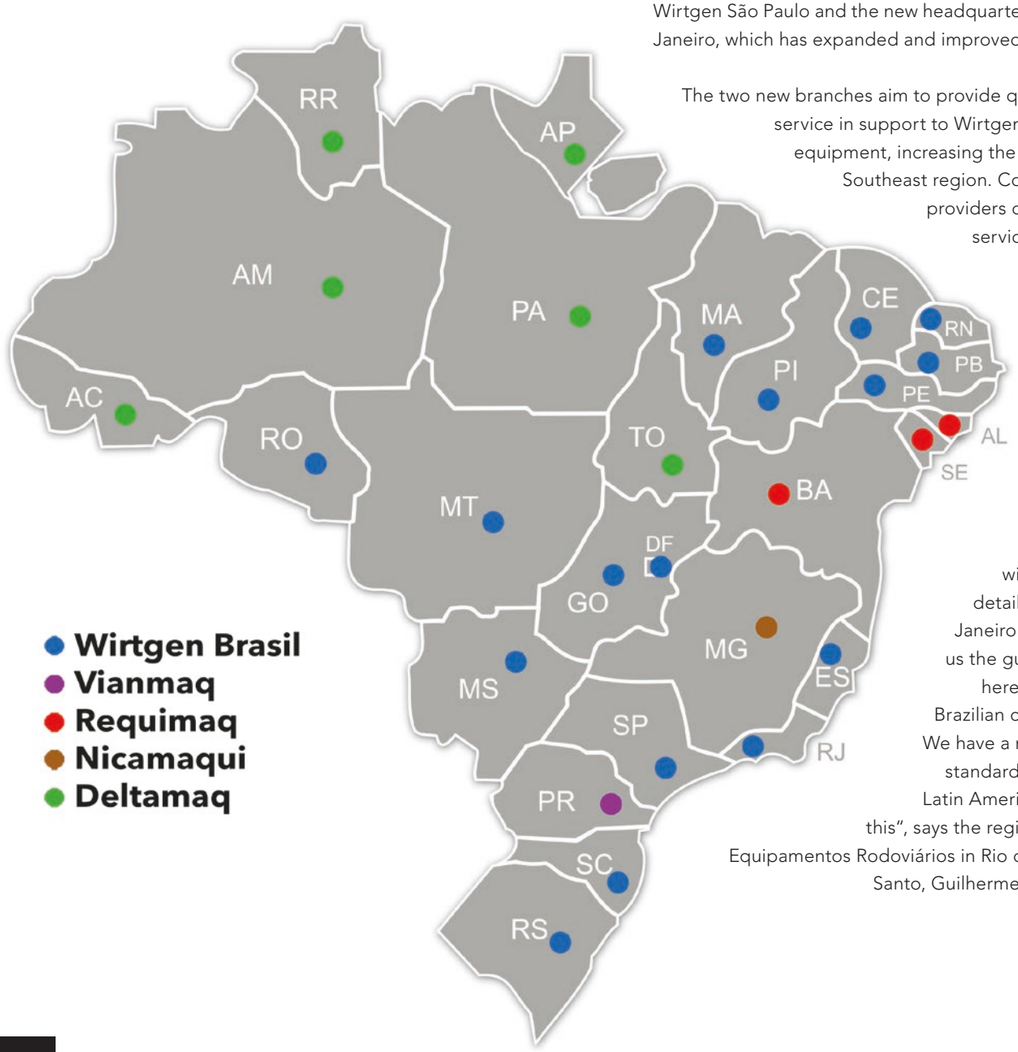
Original parts generate more savings — There is a myth that original parts are more expensive than the parallel parts, but this is not quite right. Nowadays, many equipment or homologated parts manufacturers maintain competitive prices compared to the parallel parts.

It is also necessary to take into account that the frequency of maintenance generates costs for the company, both direct and indirect. If a machine breaks often, the company will have expenses in the purchase of components and workforce. More than that, it is necessary to calculate how much is not gained during the time the machine is unavailable.

There is also the immeasurable cost to the company's image due to the risk of delays service delivery. It is essential for the growth of the company it is known in the market for service provision excellence. The use of parallel parts may seem advantageous in the short term. However, the medium and long terms, it influences the financial aspect and even the risk control.

SUPPORT TO WIRTGEN GROUP and CIBER EQUIPAMENTOS RODOVIÁRIOS CUSTOMERS

The essence of the of the Wirtgen Group business philosophy worldwide is “to be close to our customers”. In companies that are part of this conglomerate, the phrase has become a true mantra, used daily, without measuring efforts to apply the motto in practice for the benefit of customers. Along this line of thought, the Wirtgen Group has five branches in Brazil. In addition, there is a network of dealers spread across Latin America, Africa, Australia, and New Zealand, regions of Ciber plants sales, as well as in all other countries all over the world where the Wirtgen Group product support network is also present. All dealers work in customer support (trainings, product delivery, maintenance support, parts and services demand support, having even mobile workshops) because the customer has deadlines to meet and needs flexibility in maintenance and repairs.



Since January 2016, Ciber Equipamentos Rodoviários has been integrated into the Wirtgen Group via SAP system. This change had a positive impact on how customers’ demands are identified and supported by the distribution network. Inventory planning and service demands of Wirtgen Brazil subsidiaries are 100% integrated with Ciber and with the factories in Germany. Dealers inquiries and the inclusion of orders are processed via dealer portal, also already integrated and in use.

This integration reinforces the group’s commitment in reducing response times, meeting customer demands for speed and agility when required. Added to this initiative is the constant investment of the Wirtgen group to expand delivery availability. In Brazil alone, between Ciber and Wirtgen subsidiaries Brazil, there are over 12,000 items and 600,000 units for immediate service, a fact that has resulted in an average rate of same day delivery of 90% of orders received by Ciber in 2015.

Recently, two important steps have been taken: the opening of the Wirtgen São Paulo and the new headquarters of Wirtgen in Rio de Janeiro, which has expanded and improved its service capacity.

The two new branches aim to provide quick and differentiated service in support to Wirtgen group customers and equipment, increasing the service capacity in the Southeast region. Construction and service providers companies that use the services in Rio de Janeiro or São Paulo can count on a structure that is found in all branches of the group around the world, which is a global reference in customer service in the road building sector. “We discussed with Germany all project details regarding the Rio de Janeiro branch, and they gave us the guidelines to be applied here, adapting them to the Brazilian construction standards. We have a model in the European standard and there is no one in Latin America with a structure like this“, says the regional manager of Ciber Equipamentos Rodoviários in Rio de Janeiro and Espírito Santo, Guilherme Rodrigues Ratkiewicz.

WIRTGEN BRAZIL - RIO DE JANEIRO

Located in the city of Tanguá, the Rio de Janeiro branch occupies an area of approximately 5,000 m², with a location that, as soon as the works of Arco Metropolitano are complete, will provide this venture full accessibility to various regions, particularly to the South and Northeast regions of the state, such as the cities of Macaé and Campos.

The unit also has a robust inventory of parts, which meets customers’ demands immediately, and has a large workshop and machine-washing area.

“When we have demands that we can not solve, we contact the technical assistance and they always serve us well. Service and support are very good, in addition to the good technology. We are satisfied“, says the engineer Willian Linhares, responsible for equipment maintenance at the company JRO, a company that has had Wirtgen machines since 2003.

Another customer that has been assisted and is satisfied with the structure of Wirtgen Rio de Janeiro is Córrego Rico. “We had an excellent customer service experience. The technicians are very good and agile, I remember that when we ordered a part for the asphalt plant that was operating, and we received a fast service. We are pleased with the service“, said the owner of the company, Dionattan Medeiros.

WIRTGEN BRAZIL - SÃO PAULO

As one of the major economies and equipment consumers, the state of São Paulo now also offers a more customized service with the opening, in July, of the Wirtgen Brazil São Paulo subsidiary, in the city of Campinas.

According to Clauci Mortari, commercial director of the company, São Paulo is the largest market in Brazil and providing services directly with Wirtgen Brazil is a differential for such a demanding and highly sophisticated audience.

"Wirtgen Brazil SP will devote to this segment a very special attention to consolidate our leadership in such a competitive market. The attention in parts and services is an important difference. We have a large stock of parts, already stored in our Campinas warehouse to make it available to the market", he said.

The choice for Campinas was made because it is an important logistics center in the state of São Paulo. The building has an area of 10 thousand m².

The new structure increasingly seeks to narrow down distances and the relationship with the purchaser of the equipment, both in pre and after-sales. "The idea of Ciber and the Wirtgen Group is to work in a closer and more qualified way in a competitive and demanding market. We understand that one of the main paths to differentiation in Brazil is the technical training of all professionals involved in road construction", said Clauci.

In this sense, training and experience are permanent targets of the Wirtgen Group, both in the preparation of customer support teams, and in the preparation of maintenance teams and customer operation. On Ciber website, you can check out our training schedule.

In Brazil, a few years ago, we offered local support with external consultants and field technicians that are dedicated to visit jobsites promoting good maintenance and operation practices. Through the dissemination of our specialized literature (series Parts and More Compact, Parts and More, Paving Manual, among others) and through the application of maintenance control tools and wear analysis (check lists, picks practical tests and cost-effective analysis), those consultants and technicians put our mantra into practice, "to be close to our customers," offering qualified support in order to contribute to the results. In this highly competitive environment, cost control and the influence of maintenance on the use of the existing opportunities are very important. That is exactly why we seek to support our customers' decision-making through cost-benefit correlations, impacts on production, and availability of equipment for the work, as well as workforce use.

Our motivation is to obtain acknowledgment of the quality of support delivered to the customers, in addition to its relation with the results obtained. Try our specialized support and guarantee your competitiveness in the market.

Providing services to you is our passion!

"We had an excellent customer service experience. The technicians are very good and agile, I remember that when we ordered a part for the asphalt plant that was operating, and we received a fast service"

Willian Linhares, of the JRO company

Ciber asphalt plants
reach the New Zealand market

With technical delivery in March, the plant helps in the country's highway expansion phase

The Oceania market trusts the quality of the asphalt mix for the expansion of its highways. Already present in countries such as Australia, Malaysia, and Papua New Guinea, Ciber is going to have an asphalt plant operating in New Zealand. From the Wirtgen New Zealand subsidiary, the UACF 19E asphalt plant will operate in Christchurch, the third largest city in the country, through Higgins contractor.

Specialized in infrastructure projects in the island country located in the west of the Pacific Ocean, the company began preparing the site for the installations in the end of 2015. The production will be focused, primarily, on the process of highway expansion, but it can be extended to other types of paving projects.

With a production capacity of around 100 to 150 Ton/h, the UACF 19E asphalt plant will initially produce conventional asphalt concrete. In a second stage, a mixture with asphalt modified with polymers or rubber will be produced. In addition, the RAP (Reclaimed Asphalt Pavement) system will be added to the equipment in order to produce mixtures that reuse the asphalt removed from paved roads.

The plant is customized for New Zealand projects, thus, an important challenge comes from the safety and environmental regulations required by the country. To align those issues, a series of production tests was carried out by a full support team, which included a product support engineer, two automation engineers, and a service technician.

The great advantage of the plant is that the equipment can operate with up to six feed bins, which allows more complex mixtures to be produced. This means that up to six different aggregates can be used in the mixture. The equipment includes a Hauck Burner, a 303020E Tank, that is, three Bitumen compartments, and a control system with remote access.

Despite the agreement signed between the contractor Higgins and New Zealand's government for the paving projects in the city of Christchurch, the roads that will be remodeled have not yet been defined. The construction will begin this year.

Performance
brought by mobility

The use of a crushing system and a mobile screening unit in four projects it brings gains in production from North to South in Brazil

Within its over 8.5 million square kilometers, Brazil has a wide variety of land and geological formations, which gives it a wide diversity of minerals. According to the DNPM (National Department of Mineral Production) crushed stone, gravel and sand corresponded to about 25% in total volume issued in 2014.

In the country, four major projects carried out with Kleemann equipment have been drawing attention for their good production rates driven by the techniques applied and the use of crushers and mobile screens: Rocha Asfalto & Mineração (Paraíba), Gesso Integral (Maranhão), Fremix (São Paulo) and Margem Cimento (Paraná).

Located in the city of Campina Grande (PB), the project of Rocha Asfalto de Mineração, a company that has operated in the northeastern market for 30 years in various segments, has Ciber UACF Asphalt Plants and Pavers, Hamm Rollers, , plus the full line of crushing by Kleemann (one Mobicat jaw crusher, a Mobicone cone crusher, and a triple deck graded screen Mobiscreen).

One of the differences of these sets is the exclusive Dual-Power technology, which allows the power of the mobile plant for electricity from the public network. Another aspect is the standard concept of diesel-electric drive of the crushers, which allows a low operating cost of the plant with diesel consumption of 75 l/h (the average of the three equipment added).

The products coming from the triple deck screen are basically used as input for: several concrete types, hot milled asphalt concrete and simple graded crushed stone. The simple graded crushed stone is composed by different batch ranges, crushed stone 0, crushed stone 1, crushed stone 2 and dust – that are mixed according to the market demand. The plant mix of the rock crushing products results in the framing of a pre-defined range of particle size, whose final product has appropriate properties for stability and durability.

The aggregates processed from granitic rock are used by Construtora Rocha Cavalcante, mainly in public works running in the same municipality in Paraiba. The company is headquartered at Aluísio Campos Residencial Complex, which also houses enterprises of the Minha Casa, Minha Vida program, totaling 4,100 units under construction, as well as health centers, schools, Day Care Centers, parks and other infrastructure works.

In addition to the Minha Casa, Minha Vida project, the aggregates generated by the Kleemann set are used in road infrastructure and paving projects, and as the main input for the concrete blocks factory belonging to the group.

Renato Rocha, Planning manager at Rocha Cavalcante Group, talked about the experience of having Kleemann equipment in operation in their quarry. “First of all, the embarked quality and technology in all devices that are manufactured by the group are very good. Secondly, the service network. Third, the cost-benefit of equipment and their resale value. We are very pleased with them”, he said.
The works of the company began in May 2015 and should be completed in June 2017.

In Gesso integral project, the applications occur in the city of Grajaú (MA), with the use of two Wirtgen Recyclers and two Kleemann screening plants that are fed at an hourly rate of 170 tons each. Particle size is from 0 to 2”.

The gypsum extraction process takes place initially with the removal of all existing soil coverage on mineralization. Through recyclers, the fresh rock is plowed. The material is transported then to the screens, which rate the fines from the particles. The process of transformation into plaster takes place through a calcination process.

The final products of gypsum extracted by Gesso Integral are mainly used in civil construction, cement industry, agriculture (as corrective of soil) and livestock (as a raw material in animal feed). Its use also serves the following industries: paper, paints, powder, cotton, insecticides and the industry.

Those products are traded by several companies in the northern-central area of the country, such as Goiás, Distrito Federal, Tocantins, Mato Grosso, Pará, Amazonas, Maranhão and Piauí.

The director of Gesso Integral, Josias Lucena, said the company developed a new dynamic of mining and processing of gypsum with the use of Wirtgen Group equipment. With Wirtgen and Kleemann equipment, we eliminate the use of explosives and many other types of equipment used in conventional mining systems. Therefore, we improve the process from the environmental perspective and decrease the costs. We consider that important”, he said.

Currently, Gesso Integral has a park of six ovens of gypsum calcination. In 2013, the company became the first one to mine gypsum in Brazil using Wirtgen equipment that extracts the material without the need of explosives in the process. Wirtgen Recycler was rented for the three-day period to identify the feasibility of extraction. With two hours of operation, the machine would not be returned to its former owner, which shows the satisfaction Gesso Integral had with the equipment’s performance.

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>
> **Renato Rocha,**
> **Planning manager at**
> **Rocha Cavalcante**

A year later, a Wirtgen Recycler that shows gains in productivity and is more compact was acquired, in addition to a mobile Kleemann screening plant, which classifies gypsum for sale within the mine, eliminating the need for primary transport, crushing, re-crushing and grinding.

Currently, Gesso Integral works at Gypsum reserves in the states of Maranhão and Piauí, and limestone in Pernambuco, the latter being responsible for the largest deposit found in the west of the state, with reserves of over 600 million tons.

From the northeast to the southeast and south of Brazil

In the Ayrton Senna highway project (SP-070), carried out by Fremix, the mobility of the equipment used had a fundamental role, highlighting the adaptation capacity of Kleemann impact crusher. Assembled on a chassis on tracks, the machine allowed for lane waste processing, including the asphalt layer and BGTC (cement base), and solved a critical issue.

For Elio Cepollina Junior, Comercial Manager of the company, the main issue in the beginning of the project was the question on how to repair the asphalt without interrupting the daily traffic of 90,000 vehicles on a stretch that connects the largest airport in Latin America – Cumbica, in Guarulhos, SP – to São Paulo. The mobility provided by the crusher offered a new logistics condition, reducing the cost of transportation of the materials produced.

"Sometimes you need greater mobility between two different sites in your project and even within just one of them, and we had this feature available on Ayrton Senna. We are positioned at Km 11 and Km 44 of the road", said Elio Cepollina, who also evaluates positively the crusher purchased and used four years ago on Fremix demands.

The relationship between Fremix and Kleemann dates back quite a while already. The first buyer of the machines of the German company in Brazil, Fremix had the know-how about the demolition of two buildings up to 30 floors in São Paulo. At the occasion, the mobile crusher was used in the processing of waste from the buildings. The whole CDW (Construction and Demolition Waste) obtained in the operation was processed in material used in the composition of the subbase of a higher quality urban road on Sapopemba Avenue, in São Paulo. Some time later, Fremix joined the Ayrton Senna roadwork for issues related to engineering, specially the grading curve.

With a nominal production capacity of 350 ton/h, the impactor used on Ayrton Senna operates with the average productivity of 300 ton/h and has peaks approaching the nominal capacity. On Ayrton Senna road, the final product reaches 25 mm or even less.

Towards the southern part of the country, parallel to the services provided in São Paulo by Fremix, another large size construction work uses Kleemann equipment leased and operated by Fremix. More specifically, talking about „Supremo Cimento" from Adrianópolis -PR, small town located in Vale do Ribeira, on the border with São Paulo, the physical availability and the cost savings provided by the impactor mobility caught the attention of the mining manager of the company Margem Cimento, Fernandelli Gomes.

"The mobile crusher is great for us as a matter of availability, since the currently used one provides us better than other previous experiences. We managed to reduce the operation cost of the mine and, more than that, we have an availability of 85% for a production target of 24 hours/day, from Monday to Saturday, with three shifts. For normal and necessary maintenance, we only interrupt the operation of the machine for a short time", says Fernandelli.

With the operation of the Kleemann equipment by Fremix, he believes that, in addition to issues of mobility and availability, the robustness of the feeder and the machine frame were competitive factors. Regarding productivity, the impactor reached 300 ton/h end a final result with particle size 100% below 100 mm.

A world called construction aggregates

The aggregates for civil construction are the main inputs used in the production of asphalt, concrete and mortar. The main aggregates source rocks in Brazil are granite, limestone and basalt.

Recent surveys have shown that the annual production of crushed stone and sand is of 293.5 and 377.2 million ton respectively for the whole 2014. There is still the concrete rubble industry processing only 20.2% of 84.2 million cubic meters annually generated in Brazil.

The rock or concrete rubble processing are done through crushing, primarily, which is responsible for size reduction of the coarse material, and then by screening, which ranks it into particle sizes appropriate to market demands.

Even though often times they are treated as rudimentary operations, both crushing and screening are undergoing major technological advances, especially in the increase of operational efficiency, improvement of the quality of end products and lower cost per ton processed.

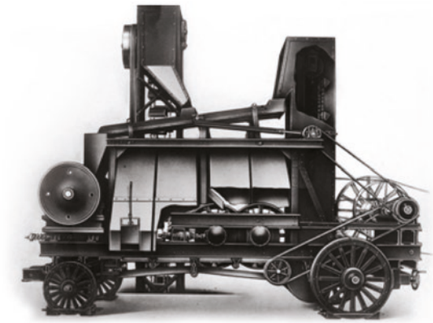
Sometimes you need greater mobility between two different sites in your project and even within just one of them, and we had this feature available on Ayrton Senna. We are positioned at Km 11 and Km 44 of the road.

Elio Cepollina Junior, Comercial Manager of Fremix

Time does not stop

The history of crushing dates back to thousands of years ago, but it was with the industrial revolution that the first machines to work on a larger scale appeared. The focus was on the generation of input to support an increasingly more urbanized society that migrated from the fields.

In the 1920s, the first crushing and screening mobile units were developed in Europe by Kleemann.



However, it was in the 1980s that the mobile units reached the basic design still used today.

Kleemann, a company with over 157 years, was acquired by the Wirtgen Group in 2006 mainly due to its robust and consistent history in the crushing and screening industry. In addition to expanding its portfolio of equipment for mining, Wirtgen reinforces its position as the leading supplier of Road Building equipment.

A new vision

One issue that has become more frequent in the past few years has been the choice between mobile or stationary crushing plants. Which one is the best choice?

In a simplistic way, stationary plants are preferably chosen for projects that will last more than 10, 20 years, whose costs with civil and infrastructure works are diluted over time. In addition, they are famous for delivering high hourly production at an acceptable cost.

The mobile Kleemann crushing and screening units have been developed to break this paradigm. The crushers have a rated capacity ranging from 200 t/h and 1000 t/h, with the necessary robustness for these operations. In addition, they have the exclusive diesel-electric drive, which reduces fuel consumption providing a lower ratio R$ / ton.

Advantages of mobile crushing and screening:

- Mobility between sites or inside one same area
- Flexibility: depending on the aimed products, the disposition of equipment may be modified
- Fast operation start
- Drastic reduction or even elimination of civil works
- Possibility of operation with diesel or electric power of the public network thanks to the optional "Dual Power" available on some models
- Continuous flow of production due to the possibility of equipment interconnection
- High resale value
- Portfolio with a wide range to meet the needs of different markets

From discourse to practice

Kleemann has within its main technical advantages the diesel-electric drive of its crushers. All crushers are equipped with electric generators, which are responsible for the activation of auxiliary operations, such as conveyor belts, pre-screens, magnetic separators, etc. This concept provides a significant reduction of fuel consumption and enables the control and adjustment of the crushers according to the customer's needs. In this way, all equipment can be interconnected, which minimizes or even eliminates sudden interruptions in production: the equipment identify increases or decreases in feeding and automatically corrects its operating speed.

Still in the field of technological advances, Kleemann offers the largest range of equipment that can be supplied with Dual Power. This option allows the machine to work with diesel or electric power from the public utility system. Thus, the customer chooses the electricity source they want to work with. This flexibility eliminates „forced outages" of the operation caused by the inability to use public electricity use at certain peak times, or avoids extra charging on the kWh amount.

Between
the Amazon Forest and the Cerrado

In modernization works of a stretch of Belém-Brasília road, Ameta Engenharia uses conventional shallow milling

Just over 50 years ago, the president of Brazil at the time, Juscelino Kubitschek, started another work of his national integration project, connecting the new capital, Brasilia, to the rest of the country. On May 19, 1957, through Decree No. 3710, he created the Executive Commission of Belém-Brasília Highway (Rodobras), which would, however, be linked to the SPVA (Superintendence for the Amazon Valorization Plan) which, in turn, would integrate the Amazon to the entire national economy.

The beginning of the operation had in its project 2,200 kilometers of extension to be reached through the rainforest, backlands and cerrado regions, and it should be delivered by 1960, along with the rest of the integration plan, which would expand the Brazilian domestic market. For the time, a work like this was almost impossible to be completed in such a short time, with both the investment required and also the technology and capacity of the operating machines.

After decades, the Belém-Brasília highway remains one of the most important of our territory, with its system of more than 1,900 kilometers of extension which includes the states of Goiás, Tocantins, Maranhão and Pará, in addition to the Federal District; it is on a corridor located between the Midwest cerrado area and the Amazon forest in the Northern Region, covering the roads BR-010, BR-153, BR-222, BR-226, and BR-316.

With the changes and the evolution of road machinery technologies, it is essential to apply those changes also to the older roads, the case of Belem-Brasilia. With this and other goals, such as improving the conditions of the road and recovering asphalt pavements, in August 2014 the revitalization of BR-316 started, in the stretch between Santa Maria and Itinga, state of Pará.

The project is under the responsibility of the National Department of Infrastructure and Transport (DNIT), licensed by the Consortium CCM / SR / Getel, which subcontracted the Ameta Engenharia in a work of 375 km of extension.

Pavement revitalization was carried out with the W100 milling machine using conventional shallow milling. Concerning the thickness of the cut, the shallow milling is related to the correction of functional defects and surface patches. It is mainly applied to urban roads, where the aim is to maintain the pavement gradient, sometimes reaching larger depths.

For the surface roughness of the track, fine milling was used, with application of milling cylinders with a lateral distance between the cutting teeth of approximately 8 mm, resulting in reduced surface roughness and lower grooves on the track, which enables such classification.

In the specific case of this work, the execution of the milling was adopted before the application of new coating to remove the old HMA (Hot Milled Aspahlt), which showed signs of fatigue such as cracks, in addition to gradient correction reducing highway irregularities and maintaining the original trim lane onto the shoulder.

There was also a follow-up of the milling speed. The machine milled 5 cm depth and moved at speeds ranging from 20 to 22 meters per minute. Considering the stops for maintenance and picks change, the milling operation had an average production of 1,100 m² milled per hour.

According to Rodrigo Souza, Engineer at Ameta Engenharia Ltda., the choice of the milling machine W100 was made because the Wirtgen Group equipment indisputably present an excellent performance, as well as after-sales, which is very good in the region. The delivery time of the equipment was also decisive in the acquisition. "The W100F exceeded our expectations, both in production and in strength. Throughout the work, we did not have any stops for corrective maintenance, the equipment was available the whole time", he said.

"The W100F exceeded our expectations, both in production and in strength. Throughout the work, we did not have any stops for corrective maintenance, the equipment was available the whole time"

Rodrigo Souza,
engineer at Ameta Engenharia Ltda.

TECHNICAL INFORMATION

Construction work: BR 316 Revitalization
Location: Between the cities of Santa Maria and Itinga/ PA
Length: 375 km
Technique: Conventional shallow milling. Asphalt mix: Hot milled Asphalt (HMA). An average of 5 cm on the 7 meters of platform were milled at the job site. The drum used was FB 1000 LA 15.

Recyclers

reduce time of stabilization and improve the soil

Even though it is not common in many works in Brazil, the use of recyclers at earthwork projetcs offer quality homogenization

The use of recyclers in soil homogenization is not yet common in Brazil, but the technique brings gains in earthwork, especially in implementing improvements in the subgrade and base structural layers of a road. In addition to providing mixing and homogenizing quality, they allow the reduction of the number of equipment at the site, and reduce materials transport; they also improve the speed of execution, and therefore ensure greater productivity.

Even though not yet used in many works around Brazil, there are companies that are already doing this type of application and obtaining good results. This is the case of CM Construções, which before using the Wirtgen recycler used to work in soil stabilization using graders, tire tractors with plow grid and several water trucks. Since the company started using recyclers in earthworks, time spent with soil stabilization decreased about 35%.

With knowledge on the issue the Mechanical Engineer Ronielson Baldoino, from CM Construções is an admirer of the new technologies that bring speed and quality to manufacturing processes, such as the recycling in road construction. “In conversations with fellow civil engineers, is unanimous that the use of recycling in the stabilization of the layers that make up the pre-coating structure brings positive results in the categories of speed and quality“, he says.

WR 2000 recyclers for soil stabilization have been used at the works on Highway EC-123/265, stretch EC-377 in the junction between the villages of Santa Cruz and Nova Cabeça Preta in the State of Ceará, which extends for 30.5 km.

In the region, the soil is clayey characteristic with the predominant HRB classification, type A-2-4 with CBR on average 45% and optimum humidity around 12%. Soil stabilization were performed by subgrade adjustment, stabilization of subgrade reinforcement, and sub-base stabilization.

Another company that has also achieved good results is Tecvia. According to the Manager Romeri da Fonte, the company has always used recyclers for soil stabilization.

“The use of the recycler reduces significantly the service execution time, reaching gains of up to 50%. In this process there is no need for soil railing/ aeration, using tire tractors with disc harrows, materials ‚overturning‘ with the use of graders and rework due to the non-fulfillment of the degree of compaction needed due to poor dosing of water and low homogenization of the soil, resulting from processes commonly used with conventional techniques”, he says.

In the case of Tecvia, the use of the W240 recycler has ensured the computerized humidity control, making it possible to reach the optimal humidity and the homogeneity of the mix in a single pass, either with or without addition of cement, lime, gravel or foamed bitumen. This is due to the embarked technology, which provides safety and reliability in soil stabilization. With the new generation of WR 200 and WR 240 recyclers, the water addition control in the process of stabilization and recycling has been improved, allowing even partial addition of water, which is required depending on the characteristics of the work. For example, on certain stretches, due to the work width at the site, it is necessary to perform an additional pass on a stretch that has already been stabilized by the recycler.

Tecvia also understands that soil stabilization using recyclers is significant because it ensures the carrying capacity of the base by reaching the degree of compaction from the perfect homogenization and optimum moisture, necessary and sufficient to meet the prerequisites of Brazilian technical standards.
“Our mission is to bring our customers the facilities and benefits from the use of such equipment, which bring the results expected by them, thus ensuring total satisfaction. We believe that Brazil still has a retrograde culture rooted since the time when there was no economic growth, which lasted for decades in the country, and that is the reason why the use of recyclers is not yet a common practice in earthwork“, he said.

Tecvia was hired by Construtora Queiroz Galvão for the works of the Wind farm, in Piauí. The interventions do not have defined mileage yet, but the soil stabilization steps were made using the W240 recycler, with the execution of subgrade, subbase and base of the access roads to the wind farm of Cal¬deirão Grande. The soil in the region is a clayey soil with a high percentage of gravel. The completion forecast is November 2015.

At Tecvia works in Mato Grosso do Sul, the recycler was made available for Odebrecht Global. At the location, with the clay soil characteristics, soil stabilization was done with the WR 2000 recycler and the soil stabilizer WR 2000XL. The execution of the recycling was the base with addition of cement and incorporation of an existing HMAC (Hot Milled Asphalt Concrete) layer. The work has 816 km of extension and should be completed in December, 2019.

In conversations with fellow civil engineers, the unanimous opinion is that the use of the recycler in the stabilization of the layers that compose the pre-coating structure brings positive results for agility and quality.

Ronielson Baldoino, Mechanical Engineer at CM Construções

Construction of the Salgado Filho Airport

Pavement of the new aircraft yard in the Salgado Filho International Airport with major challenges and high-tech

Foto: Banco de Imagens da EPC

The projects expanding and modernizing the airports in Brazil are bringing a technological legacy for construction, especially in paving. Both the takeoff and landing strips as well as the aircraft maneuvering and parking areas require different structural and surface designs. The paving companies are skillfully adapting and developing these special projects. The expansion project of the aircraft maneuvering and parking yard at the Salgado Filho International Airport in Porto Alegre is an example of a complex and very successful project, which required technology in the pavement structure and the asphalt coating and counted on high quality equipment for its production and execution.

The contractor EPC, with its headquarters in Brasilia, specializes in this type of project, with more than 50 airport paving projects on its résumé. Winner of the bidding process conducted by INFRAERO, the contractor mobilized two work fronts in order to execute the project. The first front was set up in the city of Montenegro, located 60 km from Porto Alegre, where the asphalt plant was installed. The second team was organized on the premises of the Salgado Filho airport and had laboratories, administrative offices, and construction sites and was responsible for implementing techniques at the job site.

One of the challenges of the project was paving over the local land at Salgado Filho airport, which is located in a marshland with organic soil with a very low bearing capacity. The weight of the aircrafts combined with slow and/or stationary loading, requires an extremely resistant pavement without losing the safety requirements needed in airport paving. Also, the construction of various pavement layers and, especially, the SMA (Stone Matrix Asphalt) asphalt coating, which has extremely rigid criteria on the inputs and asphalt mix, add to the complexity of the undertaking. Constructions began on September 16, 2013 and are already completed – the project was delivered on September 15, 2015. The local soft soil was excavated and removed. Then the subgrade was leveled. After this stage structural operations began, building piles 16 meters deep with capitals at the top. The piles were placed four meters apart and covered the entire paved area of 50,000 m².
Two distinct structures were used over the regularized and piled ground, one designed for parking aircraft and another for their

maneuvering area. The first area included a subbase of graded gravel (BGS), a layer of roller compacted concrete (RCC), and on top a concrete slab of 30 cm. 38 cm thick concrete slabs placed on the surface. For the maneuvering yard, a layer of graded gravel and three asphalt layers were built over the piles. The first one is a binder layer, the second is a high modulus asphalt HMAC (high modulus asphalt concrete), and the surface layer is a SMA layer. The following images show a sketch of the structures and a photo of the finished pavements.

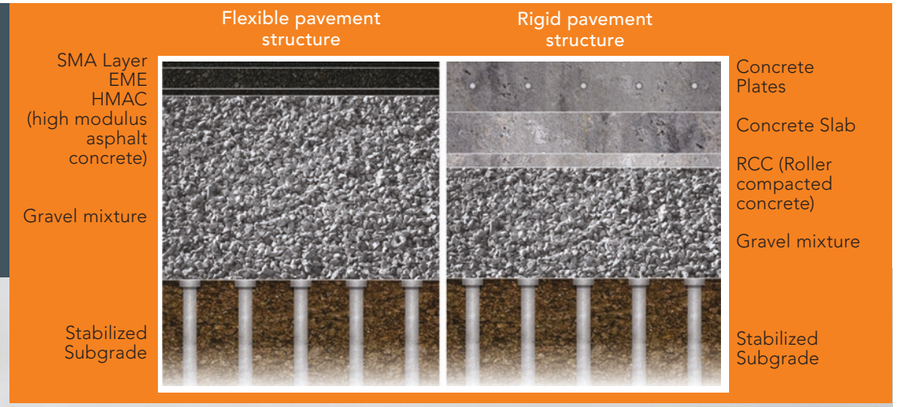


Foto: Banco de Imagens da EPC

The aircraft parking area should not have an asphalt coating because when the aircraft's turbines are turned off or on, it is common for kerosene to drain out of them. This fuel reacts with the asphalt, disaggregating the mixture by ungluing the Asphalt Concrete Bitumen film around the surfaces of the aggregate and causes early problems on the pavement. Also, the load transfer from a static load is more severe than from a dynamic load, requiring a more rigid structure. However, in the maneuvering area, when the aircrafts are in motion, the stress on the pavement is less and it needs to have a rougher surface in order to increase the friction between the tire and the pavement and thus avoid accidents.

"The rigid pavement, which does not have an asphalt coating, was adopted in order to comply with the international law. This means that the Salgado Filho International Airport meets the ICAO and FAA standards. The major gain when compared to the flexible surface is that there's no reaction of the asphalt with the kerosene drained from the turbines, which disaggregates the mixture and causes early damage to the pavement. Another point is lower maintenance costs," notes Douglas Hypolito, construction coordinator of CTPA, Infraero's Engineering Management in Porto Alegre.

The flexible structure supported by concrete piles and a graded gravel structure had three different types of asphalt mixtures in the upper layers. The deepest asphalt layer, called binder, was laid 5 cm thick and complied with the range B requirements of DNIT (National Department of Transportation Infrastructure). This mixture has coarser aggregates than the traditional range C. The design AR content of the binder was 4.5% and the AC used was produced by Petrobras in Brazil called Bitumen 50/70, which is very common in Brazil. On top of the binder layer a high modulus asphalt HMAC (high modulus asphalt concrete) mixture was applied 15 cm thick and divided into three 5 cm layers. According to Marcelo Zubaran, specialist in Ciber's products, "The HMAC (high modulus asphalt concrete) mixture is characterized by a high resistance to vertical forces, with a high resilient modulus (relationship between stress and strain during a repeated load cycling test), which is a fundamental point in airport paving." This mixture was designed with 4.7% of a special polymer-modified Bitumen with the rheological characteristics required for a high modulus pavement (low penetration and high softening point).

For the surface layer, a 5 cm layer of SMA was applied, which was a mixture with a discontinuous grading curve (large amount of coarse and fine aggregate and a small amount of intermediate aggregate sizes). The SMA mixture promotes greater contact between grains resulting in greater mechanical strength. The thickness of asphalt binder around the aggregates is larger, increasing the stability and flexibility of the mixture. An asphalt concrete modified with SBS polymer was used and the design content was 6.3%. Common in SMA projects, 0.3% of cellulose fibers was added based on the weight of the mixture. The fiber increases the surface area of the mixture and allows more Bitumen to be added without the binding agent draining out. The fiber is added in the asphalt plant by a 2 m³ bin with a high precision dosing. Before entering the mixer of the plant, the fiber passes through pipes close to the combustion chamber of the plant, and receives heat by thermal conduction. This process is essential for the fiber to „open" and thus is better distributed in the aggregate, avoiding segregation of the mixture.

The iNOVA 1200 P1 plant, used to produce the SMA mixture, has 4 feed bins with individual weighing and pick up systems which ensure the perfect proportion between the aggregates and aggregates and Bitumen, as well as a dryer exclusively dedicated to drying the aggregate, ensuring a good adhesive bond between the stone and asphalt binder in the next mixing process. The equipment also has an external pug mill mixer with a dry mixing stage (mixing the coarse aggregates, fine solids from the bag filter and from the static separator, hydrated lime, and fiber), homogenizing the stone materials before injecting the Bitumen. In SMA mixtures, this pre-homogenization is crucial for the quality of the asphalt mixture, since it prevents fiber segregation in the mixture, and as a result, segregation of the asphalt mixture. See below an image of the plant producing SMA in Montenegro.

13,000 metric tons of asphalt mix were produced with the iNOVA 1200 within three months, and of those, 2,800 tons were SMA.

All of the necessary requirements were met throughout the production process. The aggregates were of excellent quality in abrasiveness as well as in shape index. The grading curve with a large amount of fine aggregates was achieved and the mixture presented an adequate performance for a SMA mixture.

A successful construction project brings about a long-term heritage for society. Thus, knowledge, expertise, and technology walked hand-in-hand for the success of the project.

For a safer traffic
now and tomorrow

In two editions, the event *Trânsito Legal* is brought to around 30 thousand children

""Of all nature's gifts to the human race, what is sweeter to a man than his children?" The sentence by the North American writer, Ernest Miller Hemingway, says that children are the best we have. With them, there is always hope that the future will be better than the present and the past. However, for it to happen, it is important to show them good and bad things, so they can put it into practice when they become adults. Thinking about the future generations, Ciber Equipamentos Rodoviários, in partnership with VR Projetos, sponsored, in 2014 and 2015, the show Trânsito Legal aimed at raising awareness on the risks of one of the major causes of deaths in Brazil: the traffic. According to data from the Ministry of Health, ground transportation accidents are one of the major causes of deaths in the country, recording almost 42,000 deaths in 2013.

The show Trânsito Legal, which in 2015 completed its second edition, is part of the Ciência Divertida program – an European franchise leader in interactive scientific activities for young people from 4 to 17 years-old, which aims at conducting programs to encourage motivation, self-esteem and the integration of children, helping them to better understand the areas of scientific, social and environmental knowledge in a different, informal and fun way.

In this edition, the show was at 63 schools, in three different cities: 40 in Jaboatão dos Guararapes (PE), 12 in Goiânia (GO) and 11 in Campinas (SP). In total, almost 23 thousand students and 80 adults (teachers) benefited from it. Adding to the numbers of 2014, the total is of around 30 thousand children. Last year, there were 50 presentations in 30 educational institutions in the cities of Porto Alegre (RS), Rio de Janeiro, Tanguá and Itaboraí (RJ).

One of the institutions that participated in 2014 was Jean Piaget School, in Porto Alegre. According to the cultural adviser at the school, Adriana Martins Dias, the presentation was well received by the students: "The program was very cool and well-accepted by all because the theme of traffic is an issue present in the school but not always covered in the classroom. The interactivity proposed by the program, as well as the information provided in a more playful way, help the teacher to develop it in the classroom", he says.

> **Children have much more willingness and openness for the new and for learning. Therefore, they have the ability to be important communicators of positive messages regarding traffic to the adults. We do believe in this potential.**
>
> **Luiz Marcelo Tegon, President of Ciber**

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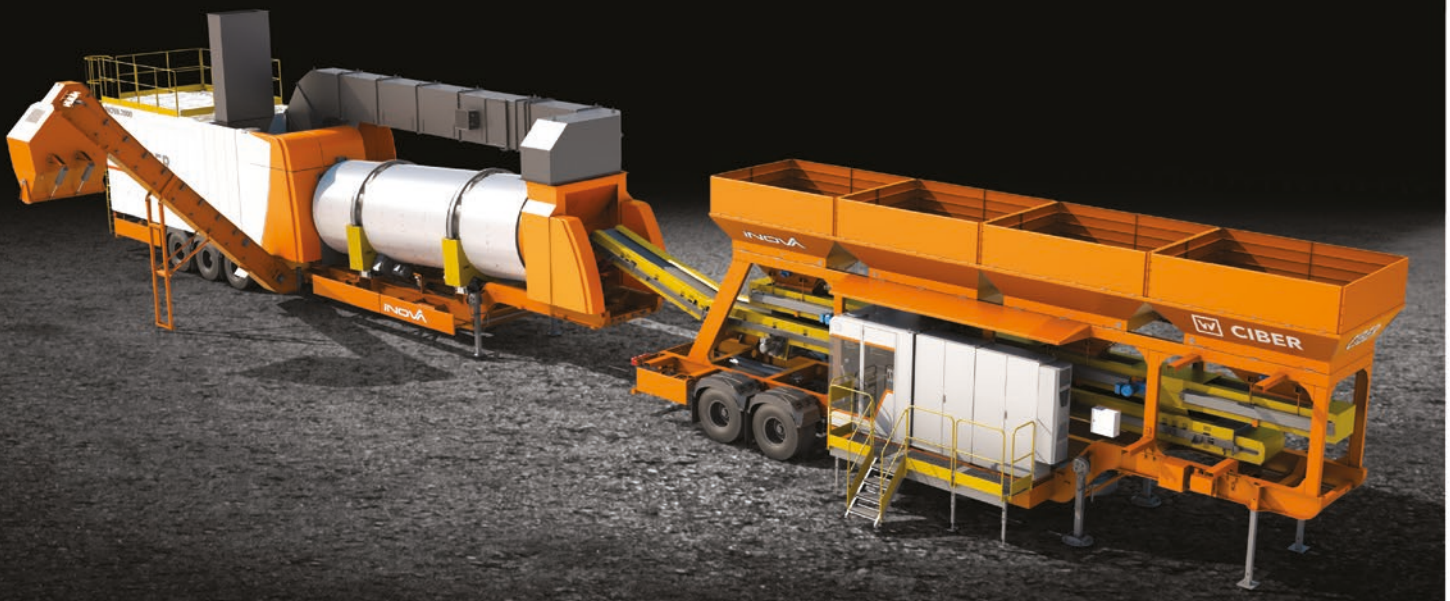

TECHNICAL HIGHLIGHTS

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