QUARRYING
Innovative Machines in Operation

Features: Experience in quarrying and loading
Advice: Economy in quarrying
Trends: Protective devices for crawler excavators
Dear Readers,

The quarrying industry is experiencing a period of rapid growth. At the same time, it is also experiencing growing pressures. In view of increased pricing pressure, companies operating in the industry are being forced to work with maximum efficiency and economy and to do so in an environment that, by its very nature, demands great input in terms of time and cost.

In our special, we will show you specific examples from quarrying in practice. How do companies use Liebherr machines in their quarries and mines? In which operations are they employed? In what kind of environment do the companies work? And how do these companies manage to achieve maximum efficiency?

The reports show that the machines used are an important criterion for working efficiency and operating costs. At the end of the day, the decisions about specific machines and equipment have an effect on the production costs and ultimately on the company’s revenue.

In addition to our customers’ experience, we wish to use this publication to tell you more about our concepts for improving efficiency. The chapter “Economy in quarrying” will give you tips about operating our machines, enabling you to work efficiently and prolong the service life of your machines.

Do you have any ideas, suggestions or questions about the use of machines in quarrying? Please send an email to quarrying@liebherr.com.

The Editorial Team
Trimming quarries for economy

When talking about reducing costs and boosting efficiency, Wolfgang Beckers is in his element. As chief representative and regional manager of Mineral Baustoff GmbH for the German state of Thuringia, he has economically optimized five of the company’s quarries to the last detail. One way of achieving his ambitious goals is by keeping distances short, but another is the efficient use of Liebherr machines.

With around 200 quarries and gravel pits, Mineral Baustoff, part of the STRABAG SE Group, is one of the largest raw materials brands in Central, Southeastern and Eastern Europe.

One of the five limestone quarries operated by Wolfgang Beckers is at Eigenrieden, near Mühlhausen. Here, two areas of 17.3 and 29.6 acres are mined. From the forecourt of the office building, we have an unhindered view across both areas. We are able to watch all productions steps, from quarrying at the face through to loading onto the customer’s trucks. One thing that is conspicuous is the fact that there are no dumper trucks or long conveyor belts in use. The entire organization is based on short distances, which saves machines, personnel and time.

“Economy is the be-all and end-all. Our operation is completely mobile.”

Wolfgang Beckers, chief representative and regional manager
Mineral Baustoff GmbH for the German state of Thuringia

“A new Liebherr R 950 SME crawler excavator recently started operations at the quarry face loading the crusher. Its reach of 42 ft 8 i is exactly configured for the conditions on site. The bucket size has been optimized for the through put capacity of the crusher. Beckers is proud of his new acquisition. “The excavator has been in operation now for three weeks, and we already have superb experience in terms of productivity and diesel consumption. In addition to the fact that it offers far better performance and a larger bucket capacity, its fuel consumption is lower than that of its predecessor.”

Beckers also puts his faith in Liebherr with his wheel loaders. Three generations are currently working in parallel. The oldest one was built in 2005, the youngest, an L 566 unit of the latest generation, has only just been delivered to the Themar quarry.

“What convinces me about Liebherr are the service intervals, service availability, the advice, the quality and the operation,” Beckers continues. “The machines are extremely durable and highly economical in operation. In particular, diesel consumption is, of course, important for us.”

Before procuring a new machine, economy and durability are carefully scrutinized and documented. “We have made direct comparisons between these machines and competitive models.”
in operations,” explains Beckers. “Fuel consumption and material movement have been recorded and compared. This has enabled us to obtain figures for fuel consumption per ton of material quarried. With Liebherr machines, we can save 1.1 to 1.3 up to sometimes even 1.6 gallons of diesel per hour. At 15,000 operating hours per year that makes several thousand US $.”

“Liebherr machines allow us to save 1.1 to 1.3, sometimes even 1.6 gallons of diesel per hour.”

Wolfgang Beckers, chief representative and regional manager of Mineral Baustoff GmbH for the German state of Thuringia.

Fuel consumption is not the only criterion that is taken into account for procurements. Service also plays an important role as it has a decisive influence on machine availability. “Machines that are not running immediately run up immense losses. That’s something we can’t afford, and that’s why we use Liebherr machines,” continues Beckers. “With the Nagel Group, we have a truly competent and reliable service partner. Whenever we have a technical question, we always get an answer straight away.” Despite the fact that operations are heavily trimmed towards efficiency, expense is not spared on the machines themselves.

“Our drivers work on the machines for up to 10 hours and must be in top form at all times. That means they get the equipment they need to make work easier. Comfort seats, climate control and auxiliary heating, for example, are features on all our machines,” says Beckers. “This makes work easier and, not least of all, it is a question of safety.”
Company profile

Mineral Baustoff GmbH

Sector: Quarry operator
Size of company: 25 quarries and gravel pits, 122 employees
Founded: 2008
Location: Germany, Central, Southeastern and Eastern Europe
Managing Director: Dipl.-Ing. Jörg Henschel, Dipl.-Kfm. Peter Kern
Website: www.mineral.eu.com
Liebherr machines in operation: L 566, R 950 SME, R 936, etc.
Economy in quarrying

Companies working in the quarrying sector are under enormous pressure to save time and reduce costs. Expenditures for operations and rising fuel costs are forcing companies to work as efficiently and economically as possible. Every company, therefore, asks the question: how can we optimize essential production factors such as equipment, work and energy in order to achieve a good turnover rate while keeping operating costs low?

Two extremely important considerations are improving mining and transportation processes. This starts with the infrastructure and organisation locally and asking: What processes are performed at the site, for example, at the quarry? How fast can the machines operate? How much energy is input to operate the conveyor belts and how much fuel is needed to operate the machines? How well trained are the employees operating these machines? The list of potential savings continues to sustainable mining, resources and the environment. We would like to illustrate these questions by looking at examples of machines. These have a decisive effect on the costs per ton of materials extracted.

**Wheel loader: up to 25% less fuel due to drive concept**

Wheel loaders are mainly employed in the industry for loading and transporting materials. In mines and quarries, large wheel loaders with an operating weight of up to 33.1 tons are primarily used. Despite this enormous machine weight and the tough operating conditions, it is important for fuel consumption to be kept low. Liebherr wheel loaders achieve this with a combination of hydrostatic travel drive and the Liebherr Power Efficiency (LPE) system.

With this drive concept, all Liebherr wheel loaders of the latest Tier4i / IIIb generation save up to 25% of fuel compared to other machines of the same size class. While fuel consumption drops, the hydrostatic travel drive makes it possible to achieve greater turnover rates per operating hour. The hydrostatic travel drive allows a particular installation position of the Liebherr diesel engine – transverse or longitudinal at the rear. Compared to conventionally powered wheel loaders, this leads to a higher tipping load with much lower machine weight and an improved turnover rate per operating hour. The LPE system proactively influences engine management by picking up the electronic signal from the accelerator pedal and computing the most efficient way of carrying out the driver’s wishes.

**Hydrostatic drive reduces wear and costs**

At the same time, the hydrostatic drive ensures that costs caused by brake and tire wear are reduced. While the freely variable tractive power control reduces tire wear by 25%, the hydraulic braking effect of the drive system reduces wear on the brakes. Companies are spared the cost of repairs caused by wear, which means lower operating costs and better results.

**Excavator automatically switches engine off when idling**

The excavator can be equipped with a function that automatically switches the engine off after a certain period spent stationary. In conjunction with the sensor-controlled automatic idling system, fuel consumption is reduced even further, lessening the environmental impact. To optimally adapt the machine to different conditions, the excavator driver can choose between four different work modes. Mode “E” (for economy) is recommended for normal working conditions, reducing the impact on both the budget and the environment. A simple touch of a button is all the driver has to do to change modes. A pre-set engine speed or hydraulic output is then made available by the machine.

**Driver usage, behavior data improves economy**

Not every driver uses a machine the same. If you analyze exactly how a machine is driven, you can draw conclusions as to how it can be used more economically. This is exactly what LiDAT – the electronic data transmission and positioning system – does. The data obtained can be used to make the machine even more economical.
The fuel consumption of the PR 744 Litronic crawler tractor stays low even at full load.

Hooked on creativity with clay

Many forms, many sizes, many colors – from classical to creative. Creaton AG offers a broad range of roof tile brands. Production runs around the clock, 365 days a year. From the production of the raw materials to sales, Creaton does everything itself. The entire process is configured for the continuous operation of huge furnaces that reach a temperature of over 1832°F in their core.
Creaton AG is one of the leading manufacturers of clay tiles in Europe. The company was formed from the merger of the two Bavarian tile works Berchthold and Ott. Berchthold was founded in 1884 in the town of Wertingen near Augsburg, the present-day location of Creaton’s head office.

In total, Creaton AG has 9 locations with 15 plants and about 1000 employees. Approximately 100 employees work at the Bavarian locations of Wertingen and Roggden. Small pan tiles are produced in Wertingen, while beaver tail tiles are made just 1.2 miles away in Roggden. Both products are manufactured in a range of different styles and colors, with about 50 different features such as ventilation or apex tiles. They are delivered to building material wholesalers and larger roofing companies, primarily in Germany and other European countries. But there are also customers in other parts of the world who choose Creaton products. For example, tiles from Wertingen were used to tile the roof of the Hofbräuhaus brew pub in Las Vegas. “We even have companies from Singapore and China on our list of customers,” explains Ferdinand Kanefzky, factory manager at the Wertingen and Roggden locations.

“80% of our raw materials is loess, 20% highly plastic clay. The clay decides how easy it is to shape the tiles. Of decisive importance is the exact composition of the different materials extracted and their mixture,” Ferdinand Kanefzky continues, explaining the production of roof tiles in Wertingen. Moisture is another critical parameter. “We go to great lengths to make sure that we start with perfect raw materials. That begins with the analysis and treatment of the material in the pit and continues through to the meticulous examinations in our own laboratories,” Ferdinand Kanefzky adds, describing each production step.

“Dosage is the first step in preparing the raw materials. The material is then put into a machine, which smashes and mixes the components. It is then sent through two rollers and pressed to about the thickness of a fingernail. After that, it is put into a vacuum chamber where the air is drawn out of the material. Now the tiles can be finished in a press with plaster molds. At this point, it still consists of about 19.5% moisture. After the next step – drying – the residual moisture is reduced to 2%. The final step before the furnace is to apply a glazing, also called engobing, that produces colors for the top layer out of minutely ground clay.

The tiles are placed in furnace cartridges and conveyed automatically through the furnace kiln transporters. The furnace in Wertingen measures some 394 ft long, 16 ft 5 i wide and 13 ft high. It takes 44 hours to pass through its 15 furnace chambers. The maximum furnace temperature is more than 1832 F. The tiles are still at about 176 F when they leave the furnace. The next step is a final examination, part automatic and part manual, before the tiles are sorted into smaller packages that a roofer can easily handle.

Every year, many tons of loess and clay are needed for producing tiles in Wertingen and Roggden. Roland Kanefzky, head of Machine Engineering and of the vehicle fleet, describes the process: “We have to be flexible according to the weather.
We cannot extract water from the raw material before molding. That means that the moisture content must not be higher than 20%, even in the pit. One Liebherr R 954 C crawler excavator is in operation at the spoil. We have Liebherr wheel loaders, one L 586 and one L 538, working on quarrying at the face. We also have an L 580 on order. The main reason was that we could get a certificate of exemption for single journeys for the L 580. That makes it easier to change sites at short notice due to weather.

To maintain reserves when operations are stopped, piles up to 623 ft 4 in long and 164 ft wide are laid out directly adjacent to the pits, and these are protected with a fleece. The wheel loaders at the face load the dumpers, which carry the material to the piles.

Operations at the face are a great stress on the wheel loaders. The material is highly compressed and very heavy, causing the equipment to operate at full throttle about 80% of the time. The hydrostatic drive is highly beneficial here. “We have performed direct comparison tests with other machines and have found truly enormous differences,” Roland Kanefzky says. “For example, the Liebherr machines are much more economical in terms of diesel consumption. The Liebherr drive is also easier to meter. After all, we have often experienced overheating problems with converter-powered wheel loaders.”

Ferdinand Kanefzky adds, “We have been working with Liebherr since 1988. Economy, quality and service are what count for us. Diesel consumption is, of course, important, especially for the wheel loaders. Apart from that, we need high-performance machines that can withstand a lot. To date we have very good experience with Liebherr as a company. If ever we have had a problem with a machine, a service representative was always there very fast. The spare parts supply has always worked totally smoothly as well. Nagel is a competent service center dealer close by with very good people who really know what they’re doing with the machines.”

“We have been working with Liebherr since 1988. Economy, quality and service are what count for us.”

Ferdinand Kanefzky, plant manager at the Wertingen and Roggden locations

“We attach great importance to working in harmony with nature,” Ferdinand Kanefzky says, explaining the company’s slogan: “Natural clay sets the tone.” “Protection of the environment is important for us. Creaton is one of the first roof tile manufacturers to be awarded the Bavarian Environmental Medal. We were one of the first to change over from disposable pallets to Europool pallets, and we stopped using plastic foil for our packaging a long time ago. We elaborately recultivate mined areas, for example, for agricultural use, or we create a biotope. We have even planted an orchard with 150 fruit trees.”
The roots of the Holemans Group go back to the year 1873, and the head office is in the town of Rees directly on the Rhine. Its core business is the quarrying and marketing of gravel and sand, and 95% of this is delivered to the construction industry, where it is used as raw materials in the production of concrete. The family business is now in its third generation and employs 130 people. It’s not just the customers who benefit from the company’s activities. Many protected species of animals and plants find new homes in the gravel pit lakes that are created. And the people in the region enjoy the watery recreation areas.

The companies of the Holemans Group deliver some 4.4 million tons of high-quality gravel and sand every year, mainly to manufacturers of concrete components, concrete transporters and construction materials traders. “Sand and gravel can be found everywhere, for example in buildings, footpaths, roads, bridges and pipes, to name just a few,” says Thomas Derksen, technical manager of Holemans GmbH. “Solar cells and microchips also contain sand.”

Sand is made up of grains of between 0.00025 and 0.08 inches in diameter. Gravel grains are between 0.08 and 1.26 inches in diameter. “Sand and gravel are also split up into various size categories. The individual fractions are separated using different processes and then mixed in precisely defined ratios for the specific requirements of the customers. “Today, concrete manufacturing is a science in itself. As the industry develops, the requirements on the raw materials are increasing,” says Thomas Derksen, commenting on trends in the sector.

The Holemans Group performs mining and recultivation in stages, many of them in parallel. Embankments and paths are laid, waterside areas fortified and trees planted. Ten Liebherr machines are used in these operations: eight wheel loaders, two wheeled excavators and one crawler.

Holemans has been placing its trust in Liebherr excavators and wheel loaders for many years. The crawlers employed to date include a PR 743. From December 2012 until July 2013, a preproduction machine of the type PR 736 was tested. The tasks of the crawler included shifting and depositing gravel fields and top soil and shaping the topography of the terrain. Some 2100 operating hours were accumulated.

“Service over the entire lifetime of the machine plays a decisive role for us. With Liebherr, we know that we can rely on a quick response and good work.”

Thomas Derksen, technical manager of Holemans GmbH

The PR 736 features an unprecedented electronically regulated travel control with integrated “eco” function and proactive power adjustment, which offers the choice between high power output and maximum efficiency. “The important thing for us is that we have power for pushing. That makes up 90 percent of our operation,” explains Thomas Derksen. “And the power available is really impressive compared to the predecessor model. Despite this, fuel consumption is on a similar level.”

Other positive aspects for the drivers were the comfort and clarity of the cab, which has been developed completely from scratch. All-round vision provides for additional efficiency and safety – even in the area around the door – thanks to edges that drop...
down to all sides and panoramic glazing. The exhaust system is completely hidden behind the A-pillar, which prevents it from obstructing the view over the engine cowl.

“Another advantage for ground levelling operations is how quiet the machine runs,” Thomas Derksen says. Particular attention was paid to this in the development of the new crawler generation. The new features also include the undercarriage. A much larger diameter sprocket wheel and more intermeshing teeth have noticeably lengthened the service life of the chain and the sprocket. Maintenance has also been optimized. Centralized service points, wide-opening access hatches and engine compartment doors, a tilting cab as standard, and an optional radiator that can be folded out for cleaning all make service work easier.

“Service over the entire lifetime of the machine plays a decisive role for us. With Liebherr, we know that we can rely on a quick response and good work,” Thomas Derksen continues. “The reliability of the preproduction crawler is quite remarkable. Throughout the entire test phase, there was not one single failure.”

Power is needed here. That accounts for 90% of our operations.

Company profile

**Holemans GmbH**

- **Sector:** Quarrying and marketing plus nature and leisure
- **Size of company:** 120 employees
- **Founded:** 1873
- **Location:** 46452 Rees, Germany
- **Managing Director:** Michael Hüging-Holemans
- **Website:** www.holemans.de
- **Liebherr machines in operation:** 8 wheel loaders, 2 wheeled excavators and a crawler
10 expert tips for long undercarriage service life

Regular servicing and the right way of working have a great influence on the service life of the undercarriage. On construction machines with chains, wear can occur in the chain bushings, sprockets, chain links, guide wheels, track rollers, carrier rollers and on the track shoes. There are several different ways to prolong the service life of the undercarriage and to reduce costs related to the undercarriage.

What is undercarriage wear?

Chain bushings
On an oil-lubricated chain, the bushing moves relative to the sprocket. This causes wear at the bushing and the teeth.

Rotating bushing chains roll freely from the sprocket, reducing wear on the bushing and the sprocket. Because of their form, rotating bushing chains are only of limited suitability for tough operations where impact stress occurs.

Tip 1: On oil lubricated chains, the bushing can still be used if it is turned around 180° in good time (with a wear level of 70 to 80%). The actual savings depend on the labor costs incurred.

Sprocket
Once the sprocket has become completely worn, teeth could break and the chain could jump. An excessively worn sprocket also increases wear on the bushings many times over. For this reason, great attention should be paid to sprocket wear.

Tip 2: As a rule of thumb, the sprocket segments must not meet tooth tip to tooth tip. At least a narrow web must be visible. Details of this can be found in the operating handbook for the machine.

Chain links
The chain links run over the guide wheel, carrier rollers and track rollers. Wear occurs on the contact areas. This often occurs in the form of wave wear.

Tip 3: If vibrations occur when the machine is in operation, this might be caused by wave wear on the chain links.

Guide wheel, track rollers and carrier rollers
Guide wheels and rollers tension and guide the chain, also transversely. Wear occurs on the running surfaces and at the side walls.

Tip 4: It is especially important for the undercarriage to be cleaned in the winter. This will prevent the carrier rollers in particular from sticking. At the same time, cleaning will lengthen the service life.

Track shoes
The webs and the track shoes themselves wear over the course of time, especially on hard ground such as rocks.

Tip 5: As an alternative to track shoes of standard quality, Liebherr also offers special track shoes that have more wearing material for high-wear operations. Examples of such special track shoes are “ES Extreme Service” or “SESS Super Extreme Service Shoes.”
What influences undercarriage wear?

**Ground material**
The type of ground material will have the greatest influence on undercarriage wear. Abrasive sand, for example, can cause wear on a chain within a very short space of time. In less abrasive materials (top soil, loam, coal), the undercarriage will last much longer.

**Chain tension**
Correctly setting the chain tension is a basic requirement for optimal service life of the undercarriage. Practical tests have shown that the right chain tension can lead to a service life of the bushing up to 75% longer than with the chain overtensioned. The service life of the sprockets is also lengthened accordingly. If the chains are too loose, this could cause the teeth to wear on one side of the sprocket.

On Liebherr crawler tractors under operating conditions, the chain should hang down by between 1.2 and 2.4 inches, depending on the model, between the guide wheels and the carrier roller or between the carrier roller and the gear ring. The correct chain tension can be easily set with a grease gun. Please refer to the operating handbook of the construction machine for details. To prevent injuries, it is important for the safety instructions to be observed.

**Tip 6:** In especially high-wear operations in soft material, rotating bushing chains can substantially increase the service life of the undercarriage. Because of their form, these are only of limited suitability for tough operations in which impact stress occurs.

**Tip 7:** The chain tension can easily be measured with a board or rod positioned between the guide wheel and the first carrier roller. Make sure that the machine is measured under realistic operating conditions as the chain may be additionally tensioned by the buildup of material on the undercarriage.

**Tip 8:** In general, it is advisable to use a centrally fitted chain guidance system with crawler undercarriages. Such a chain guidance system will absorb some of the lateral forces created when steering or driving across a slope. Alternatively, the undercarriage can be fitted with a continuous chain guard that protects the entire undercarriage against foreign bodies.

**Check your speed**
If the chains start to slip this will increase wear on the track shoes. Drivers should always adapt their travel speed and blade load according to the operating conditions in order to prevent the chains from slipping. In addition, it should be checked whether the webs on the track shoes are sufficiently high to allow optimal traction. This will greatly improve the pushing performance.

**Tip 10:** For operations on hard or stony ground, a suitably narrow track shoe width should be selected as the chain could be damaged by the lateral forces created when wide track shoes are used.

**Working with the machine**

**Travel speed**
Excessively high speed – especially when reversing – can lead to increased wear on all components.

**Cornering or working on a slope**
Tight corners or frequent unnecessary changes of direction when changing tracks can cause increased wear, especially at the side walls of the guide wheels, carrier rollers, track rollers and on the chain.

**Tip 9:** Freely variable or hydrostatic drive systems allow travel speed to be optimally adapting to all operating conditions and types of ground. Because the optimal travel speed can also be set at full engine speed, there is always sufficient tractive power available. The efficiency of such drives is constantly high over the entire speed range and no manual gear shifts are needed. That makes fuel consumption especially low compared to conventional construction machines.

**The right machine configuration**
A correctly configured undercarriage will improve the performance capability of the machine, especially in critical ground conditions. At the same time, undercarriage wear can be drastically influenced. Fundamentally, crawler undercarriages differ in the undercarriage length, the track shoe width and the related track width. As a general rule: a shorter undercarriage will provide greater manoeuvr ability and higher ground pressure on hard ground. For optimum traction on normal hard ground and the best possible levelling performance, a long undercarriage with narrow track shoes should be chosen. An extra-wide undercarriage is used on less stable (i.e., soft) ground.

**Tip 11:** For operations on hard or stony ground, a suitably narrow track shoe width should be selected as the chain could be damaged by the lateral forces created when wide track shoes are used.
The "Carrière des Grands Usages" quarry covers an area of 173 acres and is owned by the companies Eurovia and Colas. It is located just a few miles from Bourges, France. At present, 74 acres are being used to produce material for road building and concrete production. "We offer the full range for the construction industry, with grain sizes 0/10, 0/20, 0/30 and 0/60 plus 4/10 and 10/20 for the production of concrete," explains Alexandre Favin, operations manager of the Carrière des Grands Usages quarry, or CAGU for short. Other products include filling sands, drainage materials with 40/70 grain, as well as blocks of rock from 3.9 to 7.9 in and even 19.7 to 39.4 in. "All of these are prepared according to the customer's wish, for example, for fortifying embankments or as decoration for landscape architects," the operations manager adds.

The most important customers of the CAGU quarry are the members of the syndicate that own the quarry. These include the locally based companies Eurovia and Colas, but also civil engineering companies and two ready-mixed concrete plants in Bourges. The Carrière des Grands Usages quarry includes the Morthomiers limestone seam, which is very well known in the region. The excavation permit allows 402,344 tons per year to be quarried until 2034.

"Prior to excavation, we have to clear 7.9 to 11.8 in of spoil and then a 19.7 in to 6.6 ft deep layer of material. Depending on its quality, the latter layer may either be sold or used for filling on the quarry grounds," explains Alexandre Favin. Drilling and blasting are outsourced to a subcontractor.

A crawler excavator from 2005 was used in the quarry until June 2013. The excavator loads a rigid-frame dumper truck that transports the limestone to the charging hopper of the processing machine. The material is conveyed by an apron conveyor to a scalper where the stone is separated and sieved. Material larger than 4.7 in is carried to the primary impact crushe which produces material of grain size 0/31.5, 30/70 or 30/150 and 70/150. A second impact crushe produces material of grain size 0/4, 0/20, 4/10 and 10/20.

The R 950 SME flexibly performs its tasks on the excavation front.

The materials from the machine are taken to the stocking bays by a rigid 30-ton dumper truck. Besides the production of construction materials, the quarry is also able to take earth from construction sites. "Customers tip their earth onto a platform especially provided for this purpose and we spread it with a crawler loader to fill the quarry grounds," explains Alexandre Favin.

"With 11,500 operating hours, the crawler excavator had already reached a ripe old age," Alexandre Favin tells us. "Moreover, this 55-ton excavator was somewhat oversized in view of the economic development," he adds. "More than anything we wanted a smaller excavator." The operations manager at the quarry was really looking for an excavator of about 44 tons.

He compared the offers of the different manufacturers, including Liebherr. He asked Liebherr if he could test the R 946. Fabien Denis, technical customer consultant at the SOMTP Centre, the contractual dealer for Liebherr in the region, recommended the R 950 SME (Super Mass Excavation), a new machine that was launched in 2012. "That is the quarry version of the R 946," Fabien Denis says. "It has the turntable of the R 946 and the undercarriage of the R 956. Its boom and bucket arm are reinforced and the ballast weight is higher. The driver's cab and the tilt cylinder feature safety devices, and the windows are made out of armored glass. The underbody is protected by a thick guard plate." In contrast to the R 950 SME, neither of the competition models that were considered was specially designed for work in a quarry. "In our region, we are heavily involved in the Eurovia companies," Fabien Denis adds. "But this is the first R 950 SME within the Eurovia Group," Alexandre Favin explains. The Construction Machines department of the road building company is monitoring the testing of this model at the CAGU quarry with interest. Another advantage is the vicinity to the Liebherr contractual dealer SOMTP Centre. This is just a few miles away from the quarry.

That's how the R 950 SME came to find its place in the quarry's machine fleet. It is equipped with a Liebherr backhoe bucket with semi-delta cutter and 3 yd³ capacity without special wear protection as the material is not especially abrasive. "This procurement was part of a partnership," Alexandre Favin tells us.
“SOMTP Centre can use the opportunity to present the R 950 SME to us as an alternative to its most important competitive products,” Fabien Denis adds.

“This dealer really has orientated itself toward our requirements. If necessary, he calls in the evening after production has stopped,” says Alexandre Favin, who also stresses the responsiveness of the dealer. When excavator driver Jean-François Méry explained that it is sometimes difficult to dig into the piles of material, Fabien Denis proposed trying out more pointed teeth. “It’s easier with the more pointed teeth,” comments Jean-François Méry. “We have now fitted the backhoe bucket with five teeth of this form,” explains Alexandre Favin.

The Liebherr engine in the R 950 SME has six cylinders and a power output of 295 ch, and it complies with European emissions standard Tier 4i/Tier IIIB. It is equipped with a particulate filter with active regeneration. “That is something new for us,” Alexandre Favin says. The degree of contamination is shown on the monitor on the cab display. When regeneration is due, it starts automatically without interrupting work. “I can defer regeneration, for example, to the next day if it becomes due near the end of the day,” Jean-François Méry reports.

The R 950 SME has been in operation since the end of May 2013. “It is dynamic and has a high rpm speed,” Jean-François Méry declares. He also appreciates the comfort of the driver’s cab and the low noise level of the excavator.

The dumper truck is now loaded in nine cycles instead of seven. “That is just what we need,” says Alexandre Favin. “It is a highly versatile excavator.” Half the time it is used in production. The rest of the time it is used for spoil work, loading blocks, and exploratory work at new parts of the quarry. “The R 950 SME is equipped for high-volume turnover, which extends its range of applications. And the excavator driver is able to choose the most suitable of four working modes for his current work,” Alexandre Favin adds. “In addition, our excavator driver asked us to choose the optional boom float function, which prevent unnecessary
The operations manager knows the benefit of the excavator’s automatic engine shutdown function after a ten-minute idle period, which saves fuel. Now he is starting to use LiDAT, Liebherr’s data transmission and positioning system in order to learn more about the operating and driving times, deceleration and fuel consumption of the excavator.

Transport of excavated and prepared material via conveyor belts.

Company profile

**Carrière des Grands Usages (CAGU)**

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<th>Sector:</th>
<th>Excavation of building materials</th>
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<td>Size of company:</td>
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<td>Founded:</td>
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<td>Managing Director:</td>
<td>Alexandre Favin, operations manager</td>
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<tr>
<td>Liebherr machines in operation:</td>
<td>R 950 SME</td>
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The Liebherr backhoe bucket with a digging volume of 3 yd³ was equipped with pointed teeth, which are superbly well suited to the material.
Operators can choose between a piston rod guard for the cylinders, bottom boom protection for the stick or monoblock, wear plates on the undercarriage and many other individual measures for protecting both man and machine.

1. Piston rod guard
   • Simultaneously moving metal covers protect the chrome-plated piston rods against damage.
   • Available for bucket cylinders (all machine types), hoist cylinders R 956 to R 980 SME, crowd cylinders for front shovel machines from R 956 to R 9 80 SME.

2. Hoist cylinder hose protection
   • Protection for hydraulic lines and line-break protection for hoist cylinders.
   • Optional for R 936 to R 950 SME.

3. Bottom boom protection for stick and monoblock
   • Prevents damage to the stick and the monoblock.
   • Protects the underside of the stick (bottom boom) and/or the monoblock with a solid metal cover.
   • Especially suitable for working under hard conditions.
   • Stick: available for R 936 to R 980 SME.
   • Monoblock: available for excavators R 918 to R 980, R 936 to R 960 SME.

4. Protection for slewing mechanism and lubrication lines
   • Protects the slewing mechanism and the lubrication lines in this area against damage, especially during wrecking ball operations.
   • Covers the slewing mechanism and the lubrication lines.
   • Available for excavators R 950 to R 980.

5. Protective grille for driver’s cab
   • Protective grille in front (FGPS) and top (FOPS) area of the driver’s cab protects against flying stones.
   • Available for all types of machines.

6. Armoured glass
   • Front and roof glass in the driver’s cab can be equipped with impact-resistant armoured glass, offering additional protection for the driver.
   • Available for all types of machines, standard for R 966.

7. Guard plate
   • Protects the undercarriage against damage and wear, especially when working on loose piles of material and/or during wrecking ball operations.
   • Available for R 950 SME to R 980 SME.

8. Travel drive guard and reinforcement kit for transmission bearings
   • Reinforcement panels protect the outsides of the travel drive and the transmission bearings on the inside of the longitudinal members against damage (e.g., when working on piles of loose material).
   • Available for excavators R 950 SME to R 980 SME.
“Even in ancient Rome, asphalt was used for road building,” explains David Güttler, managing director of a+b Asphalt- und Betonmischwerke. “Asphalt is versatile in its use and can be adapted to meet different requirements. Depending on the purpose, load profile and climatic conditions, we can configure the right asphalt for any customer requirement, prepare the initial tests, select the most suitable raw materials and manufacture our product entirely according to generally accepted technical standards. Asphalt production is monitored in our laboratory. In addition, an independent institution also conducts checks. We bunker the asphalt in different silos, each holding about 132 tons. We can store up to six different types there. The ready-to-use asphalt is loaded onto the customers’ lorries at temperatures of about 356 F. When we have real power days, we start work at about 3.00 a.m. so that we have about 661 tons ready by the time operations start in the morning. The types depend directly on what the customers have ordered. If needed, we can fill all the silos with a single type. That sometimes happens when a customer is working on a major construction site.”

Asphalt has another benefit; the construction material is 100% reusable, which reduces environmental impact and offers good economic benefits. In the asphalt machine operated by a+b, reclaimed asphalt is input in the form of milled material or fault blocks. Besides the possibilities provided by classic asphalt recycling, tarred milled material is also used. a+b prepares this in a mixing plant to form hydraulically bonded base layers for use in approved construction activities.

And concrete production? “Sand, gravel, water, cement from limestone, clay and sand: mother nature supplies all the ingredients needed for concrete. What we make of these depends on the exact mix,” explains Güttler. “We produce ready-mixed concrete with different physical characteristics, but always the right recipe for the appropriate application and environmental conditions. Our range includes: standard and heavy-duty concrete, concrete for bored piles, fiber concrete with steel and plastic fibers, colored concrete, drainage concrete, single-grain and road construction concrete, easy-use concrete, and hydraulically bonded base layers.

We rely entirely on Liebherr machines in this field. Our four concrete mixing machines are all supplied by Liebherr, as are our 32 truck mixers – articulated mixers, demountable mixer systems and interchangeable mixer systems. This is partly because we are absolutely convinced of the quality. But the closeness to the manufacturer is also, of course, highly beneficial. Liebherr-Mischtechnik GmbH is based here in Bad Schussenried, just 3 miles away.”

“The drivers are all highly satisfied with the Liebherr machines. One of them said the new 580 machine is the best machine he’s ever driven. And he’s been driving wheel loaders for more than 20 years.”

David Güttler, managing director

Quarrying operations take place over 173 acres. “The premises here are larger than the center of the village of Ingoldingen,” Güttler tells us. At the bottom of a steep slope, directly in the gravel pit, Liebherr equipment is hard at work – a Liebherr L 580 wheel loader and a TA 230 Litronic dumper. Güttler explains, “The newest wheel loader is always sent to the face. That is where we need...
the most powerful machine. Every day, the wheel loader has to extract and load more than 1,093 yd³ of material. The machine it replaces goes to the top for piling, loading lorries and feeding the asphalt machine with grit. The drivers are all highly satisfied with the Liebherr machines. One of them said the new 580 machine is the best machine he’s ever driven. And he’s been driving wheel loaders for more than 20 years.”

The driver fills the shovel with several tons of gravel at the face, apparently effortlessly. “Yes, the L 580 certainly does have power,” says Güter, adding with a twinkle in his eye, “but we’re lucky. The good thing about Oberschwaben is the wonderfully loose moraine gravel, which is easy for the wheel loader to pick up off the face. We extract the gravel over several layers. On the lower levels we have finer grain, while the coarser grains are higher up. The finer layers are taken to the concrete plant, the coarser ones to the grit plant. We produce grit for our asphalt with three crushers and different sieves with grain sizes 0/2, 2/5, 5/8, 8/11, 11/16. The charging hopper for grit production is located directly below in the pit. Ultimately, the grit comes out next to the asphalt plant, so we only have to cover short distances with the wheel loader. The dumpers take the finer gravel for the concrete plant up to a second charging hopper.”

After operations have finished, the area is reclaimed and the pit recultivated. Gutler explains, “We don’t refill, but rather take the spoil that we have taken away back to the pit bed and then add a layer of topsoil. Effectively, everything is then as it used to be, just 19 or 20 yards deeper. Some of the areas are used for agriculture. But biotopes are also created, where nature can evolve freely. For example, storks are often seen on this meadow before they migrate to Africa.”

The L 580 wheel loader extracts more than 1,308 yd³ of material every day.

Company profile

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| Sector: | Asphalt, ready-mixed concrete, gravel, sand |
| Size of company: | 65 employees |
| Founded: | 1970 |
| Location: | Biberach, Ingoldingen, Ochsenhausen, Aulendorf, Otterwisch |
| Managing Director: | David Güter |
| Website: | www.asphalt-und-beton.de |

| Liebherr machines in operation: |
| 30 Liebherr truck mixers, 3 with conveyor belt, L 580 and L 576 wheel loaders, TA 230 Litronic dumper truck, R 932 excavator |
All quarrying operations under one umbrella

The company name Recycling GmbH Lahnau is misleading. For many years, the focus of the company’s activities has been on quarrying operations, and its range of services covers all tasks relating to the quarrying and preparation of natural stone, gravel, sand and clay. The professionals from the German state of Hesse do this with 75 large machines – 48 of them from Liebherr.

Recycling GmbH Lahnau was founded in 1998 and has a direct interest in two basalt quarries and a clay and quartz sand quarry. The company also operates its own earth deposit and construction waste dump plus three construction waste recycling plants in the region of central Hesse. The most important part of the company’s activities, however, is quarrying work to customer specifications.

“When I joined the company 13 years ago, there were 11 of us. Today, the company has more than 70 employees actively working in commercial operations. This development certainly has a lot to do with our broad range of services,” explains Ralph Lang, technical manager and director. “We offer all services related to the quarrying process under a single umbrella.” The company looks after moving spoils and earth and has its own authorized blasting expert. Quarrying raw materials is also possible without explosives using hydraulic hammers. From releasing to loading to transporting, Recycling GmbH Lahnau is able to perform all surface quarrying operations. Manufacturing of end products with mobile crushers and sieves, plus decontamination and renaturalization of surface quarrying sites, are also part of the services available.

Recycling Lahnau orientates its services to the individual needs of the customer. Ralph Lang puts it like this: “We offer both partial services and the complete execution of all quarrying and preparation work. For the customer, that means that he doesn’t have to invest heavily in new machines or take on new staff. Many of our customers also appreciate the fact, for example, that they have full flexibility in how they plan their delivery volume. This enables them to respond to fluctuations in the market and, at the same time, to plan reliably. You know how much a ton of mined materials costs at the start of the year, for example.”
On average, the quarrying specialists at Recycling Lahnau are in action at around 20 different locations. One of the largest construction sites at the moment is the quarrying of limestone for Rheinkalk GmbH in Dornap near Wuppertal. Between the spoil and the actual limestone, there is a so-called cleaning cut containing some relatively good limestone, which has to be sieved before it can be prepared in order to clean out the impurities. The resulting stone material is then used to produce mineral mixtures. In Dornap, the company provides all machines and staff. Twelve earth-moving machines, including four excavators and three wheel loaders from Liebherr, are in operation here. In addition, there is also a mobile hammer crusher, a mobile impact mill with integrated sieve unit, and a coarse sieving machine.

In total, there are 75 large, modern machines. These include crawler excavators with an operating weight of 28 to 99 tons, rigid-frame dumper trucks with between 44- and 72-ton payloads, articulated trucks in the 33-, 39-, 44- and 55-ton classes, crawlers for various operations, in-hole and outer-hammer drilling rigs for various borehole diameters, wheel loaders of all sizes, mobile crushers, sieve systems and hydraulic hammers. Forty-eight machines bear the Liebherr name, including all 15 wheel loaders, 15 crawler excavators, all eight crawlers and nine articulated trucks. “The quality and resilience of the Liebherr machines are right, and that is especially important for us,” says Ralph Lang. “We also only hear positive feedback from the drivers: good handling, good performance, plenty of space and comfort in the cab. We even have excavator drivers who state categorically that they don’t want any other brand.”

“We even have excavator drivers who state categorically that they don’t want any other brand.”

Ralph Lang, technical manager and director

Another decisive criterion for the use of so many Liebherr machines is flexibility. “As a service provider, we have to be able to respond extremely flexibly to customer wishes, and to make enough of the right machines available for a certain period of time,” explains Ralph Lang. “Where the next job is and exactly what is to be done there is always decided a new, sometimes on very short notice. Liebherr and, in particular, the rental service of Liebherr Mietpartner GmbH give us exactly the flexibility we need. We have been collaborating successfully since 2003. We have competent consultants and use their experience when it comes to, say, the right choice of attachments. The machines are ordered and built exactly to our wishes and expectations. And even if a job is arranged on very short notice, we are able to bridge the time up to the delivery of a new machine with rental machines that are available immediately.”

With 48 machines in operation nationwide, service is a key factor. In most cases, a mechanic can be on site the same say or, at the latest, the following day. “The availability and response time of the Liebherr service teams are superb. The collaboration with Liebherr is perfect for our needs,” Ralph Lang tells us.

Company profile

Recycling GmbH Lahnau

| Sector:          | stones and earth |
| Size of company: | 72 employees     |
| Founded:        | 1998             |
| Location:       | Lahnau, Hessen   |
| Managing Director: | Martin Bender, Peter Bill |
| Website:        | www.recycling-lahnau.de |
| Liebherr machines in operation: | 1 wheeled excavator, 9 dumper trucks, 8 crawler tractors, 15 wheel loaders, 15 crawler excavators |

4 R 964 C with hydraulic hammer and R 960 SME for loading a dumper body.
Wheel loader operating tips

Engine speed range, drive stage and shovel control are the essential parameters that drivers can use to influence the economy of their wheel loader. The following tips will help you to get the most out of your machine, achieve good turnover rates and, at the same time, save fuel.

Engine revolutions at a glance

Engine speed / drive level: full power at low revs
On a Tier 4i/stage IIIB generation loader, the engine speed should be between 1300 and 1500 rpm and for machines of the Tier 3/stage IIIA wheel loader between 1400 and 1600 rpm. The hydrostatic drive achieves its full pump performance at 60 to 70 percent of the engine speed, depending on the type of use. Full power and low revs enable drivers to work efficiently and save fuel.

Shovel position: fill the shovel in a cutting, flowing process
The driver can achieve maximum results by taking the material onto the shovel in a cutting process. Note the control angle and the alignment of the shovel attachment. These show you the shovel position in the material from the parallelity of the blade. If you practice the right shovel guidance, the cutting process takes care of itself during forward movement and lift. Fill the shovel in a flowing movement without interruption. Filling a shovel without touching the material with the front tires will also reduce tire wear. Fast and precise work are also supported by the automatic shovel return, which makes it easier to return the shovel to the parallel rest position.

Only use manual tractive power control when needed
When working on very loose ground such as sand, you should set the machine’s tractive power to manual. Manually reduced tractive power will enable you to move and work with the highest traction possible. When you are working in sand, for example, this will prevent the tires from spinning. Manual tractive power control is available on all medium and larger series Liebherr wheel loaders. For standard operations you do not need manual tractive power control. Conventional wheel loader operations require pressure peaks on the drivetrain in certain situations. If in this case you reduce traction manually, there will not be enough power on the travel drive. Trying to increase this with the throttle will unnecessarily use more fuel.

Use the inch pedal as necessary to freely control traction
If necessary, you can freely control traction with the inch pedal. This may be necessary for deliberately slow forward traction with simultaneously high working hydraulic performance, for example, when loading a truck. As a rule, it is not necessary to brake manually as the hydrostatic travel drive already features a self-actuating braking effect.

The inch pedal should be used for deliberately slow forward traction with simultaneously high working hydraulic performance.

With full power at low engine speed, drivers work efficiently and save fuel.
It is the only hard-stone quarry in the Provence-Alpes-Côte d’Azur region,” explains Dominique Seux, director of the Grands Caous quarry, which is part of the Eiffage Group. The materials produced here, thanks to the presence of porphyry, achieve a value of 57 in the PSV test (Polished Stone Value). A value of 56 is the minimum required for the surface course of roadways. Half of the production is used for road construction. Of the other half, 35% is used for producing ready-mixed concrete and 15% is used as coarse gravel in civil engineering or as reinforcement blocks in marine and river engineering.

Porphyry has been extracted from the quarries close to the sea in the Massif de l’Estérel, where the Grands Caous quarry is located, for many years. This is where the Romans extracted the stones used to build the Via Aurelia from Rome to Narbonne. Within the immediate vicinity, the Massif de l’Estérel has supplied some of the gravel for the PLM (Paris-Lyon-Marseille) railway and paving stones for the famous Paris to Roubaix road.

In the course of the twentieth century, the quarries in these hills were gradually abandoned. However, in 1959, a civil engineering contractor opened the Grands Caous quarry. This was a deposit for the blue porphyry known as “Estérellite” with feldspar points and pyrite inclusions. At the time it made a significant contribution to the construction of the A8 autoroute, which links Aix-en-Provence to the Côte d’Azur. In 1989, the quarry was sold to GSM. In 1998 it was taken over by Appia, part of the Eiffage Group. In 2012, a license was granted to extract up to 881,849 tons per year until 2042.
“Because the quarry is located in a specially protected area, it is subject to two different kinds of regulations,” explains Dominique Seux. “Firstly, we need the approval of the administration department, just like any other quarry operator, but secondly, we also need state approval.” This approval stipulates that the quarry must remain within its current boundaries, which gives it an area of 111 acres. To continue production, therefore, the quarry digs deeper. The quarry stretches from a height of 361 feet AMSL (above mean sea level) to 59 feet AMSL, i.e., just above the level of the nearby Mediterranean Sea. Only about 5 acres of the area are actually directly on the coast. Currently, about half of the mining area of the quarry is covered by a lake of about 2.5 acres in area and 49 feet in depth, filled with surface water. When quarrying is completed, the entire area of the quarry will form a lake, which will be naturally fed from this surface water.

In meantime, quarrying will gradually spread across the remaining area of the quarry and onto the surrounding grounds at an elevation of 230 to 295 feet above mean sea level, where the production equipment for building materials is currently located. “In 2016, we want to set up a new industrial installation at an elevation of 59 feet above mean sea level while we continue to use the old equipment during the construction work,” explains Dominique Seux. “We will also take this opportunity to modernize the machines, crushers and the sieving machines, which all herald from the 1970s.”

The deposits are extracted in a closely interlinked process chain. “We perform all surveying operations ourselves, including drilling and blasting. The explosives for the weekly blasting are sourced from a supplier,” Dominique Seux says. A Liebherr R 964 C SME crawler excavator with an operating weight of 86 tons loads the four rigid dumper trucks at the quarry. Three to four times an hour, these transport the material for a distance of slightly more than half a mile to a charging hopper, which in turn feeds the primary crusher. After it has been treated in the secondary and tertiary crushers, the stone is washed as necessary. “We feed the washing plant with water pumped from our lake,” Dominique Seux tells us. The residual sand is transported to a cyclone separator, while the waste water is treated by way of flocculation in a purification plant. The sludge is then treated in a sludge press. “We recycle 85% of our water, which is then fed back into the washing plant,” explains the quarry manager. “And we also have customers for the sludge, which is highly impermeable.” This is used principally for sealing class 1 deposits. “In other words, we sell our entire production.”

The prepared materials are moved by a Liebherr L 586 wheel loader. The fleet is supplemented by a Liebherr R 944 crawler excavator, which is used in the stocking area. This is used to pile up the material so that vehicles do not have to drive over it. But it is also used for smaller jobs in the quarry, for example, clearing away surface layers.

Blocks that are too large are made smaller with a wrecking ball. The backhoe bucket has special “guide slats” for this purpose.
The Liebherr R 964 C SME, which was procured in June 2008, had clocked up 11,200 operating hours, so it was time to have it replaced. Inquiries were made to four manufacturers. “With one of the dealers it was difficult to even get an answer,” Dominique Seux says. Another dealer was located an hour away from the quarry. “In an operation like ours, everything revolves around the excavator that works directly at the face. If that is out of action for just one hour, the consequences are far-reaching.” So there remained a third manufacturer and Liebherr, which both have dealers close to the quarry. “The decision was made on the final straight,” Dominique Seux confesses. “We used to have an excavator from another manufacturer, but we had lots of problems with that. It wasn’t built for use in a quarry,” the manager adds.

“We have positive experience with the R 964 C SME. It was specially developed for use in quarries, has a robust construction and is extremely versatile.”

Alexandre Pfeiffer, technical manager of the quarry

“By contrast, we only have positive experience with the Liebherr R 964 C SME,” explains Alexandre Pfeiffer, technical manager of the quarry. He sees one advantage in the steel construction of the excavator. “The Liebherr crawler excavator is more flexible than the excavators made by the competition, and also the heaviest,” he adds. Jeoffrey Sausse, commercial director of Pic, Liebherr’s contractual dealer, explains, “This excavator has been specially developed for use in quarries. It features the undercarriage of the next larger model in a X-shaped construction to realize a better distribution of forces and prevent material from accumulating.”

Several times a year, an inspector from Liebherr customer services conducts an on-site visit together with his colleague from Pic. The technical manager of the quarry appreciates such visits. On one of these visits, a crack was discovered in the boom. “Liebherr replaced the defective equipment; that’s what I call proactive service,” he explains. “Whenever Pic performs a repair, then everything really is in proper working order.”

It was partly the experience with the excavator and partly the experience with the Liebherr contractual dealer that led to the procurement of the R 964 C SME. The decision to purchase was made by the director of the Grands Caous quarry, in agreement with the local technical manager, the regional director of the quarries and the regional manager of Eiffage Travaux Publics for building materials. The new R 964 C SME has an operating weight of 86 tons and is powered by a V8 engine generating 320 kW. It has now taken over the work of previous Liebherr excavator and has been loading the four dumper trucks at the quarry since May 2013.
To operate a hydraulic excavator economically, the teeth must have the right shape for the intended application. Liebherr’s new, patented tooth system provides the right solution for every application. It consists of a tooth adapter, tooth, securing bolt with lock and protective plug. To change a tooth, all that is needed is a simple removal tool. No hammer is needed. The securing bolt, which connects the tooth and the adapter, can be quickly and easily removed by one person without the need for great force.

The advantages of the Z tooth system:

- Optimized tooth design for a clear increase in productivity.
- High-strength steel for increased wear resistance.
- Lip and side shrouds for increased bucket service life.
- Long-lasting tooth performance due to self-sharpening shape.
- Innovative tooth forms designed for every type of ground, offering better penetration and higher efficiency.
The Ambazac and Montebras quarries

Two quarries in central France, only about 62 miles apart. The same type of excavator has to work properly at both locations: the new R 960 SME.

Why did the operators of the two quarries choose the same machine? Jean-Roger Delanne, owner of the Mines d'Ambazac, and Christian Mazière, responsible for the feldspar quarry at Montebras, are two men of the same type. Both are hands-on workers whenever it is needed – either as a blaster or as a driver. They both made a conscious decision to buy the R 960 SME because they were convinced by the capability, robustness and stability, and by the simple controls and low fuel consumption.

Christian Mazière bought the very first machine of the R 960 SME series. Following a convincing test phase, Jean-Roger Delanne has now also decided to purchase one. This decision is nothing new for the two managers. Liebherr has dominated their fleets for many years.

"Each of our quarries is different and the special features of each have to be taken into account."
Jean-Roger Delanne, proprietor of Mines d'Ambazac

Innovative products

"The machines in the catalog do not satisfy our requirements," the quarry operator adds. "We have special needs that had to be discussed with the dealer. We had the R 960 SME and the wheel loader as test machines, plus the support of a very professional demonstration team. Our staff was given instruction, in particular on the special features of the hydrostatic travel drive of the wheel loader. We chose Liebherr on account of the proximity and commitment of the dealer, but also because of the quality and innovative products."

Jean-Roger Delanne sees the relationship between product performance and fuel consumption as the great advantage of Liebherr machines. But he also rates the activities of the Solomat staff as being positive. "This development would not have been possible without them. They supported us throughout the entire approval process for the gravel for SNCF (French National Railways)." But he does confess, "There is no perfect solution. A good compromise always has to be found. With respect to the excavator tested, we made a number of modifications to the R 960 SME to meet our requirements, for example, the attachment kinematics, the choice of a reinforced version of the backhoe bucket and the modified track width to optimize mining of the extremely abrasive material."

Convincing partnership between Liebherr and its dealer

In 2005, Christian Mazière took over the management of the Imerys Ceramics France feldspar quarry and of the Montebras works. Two years later, the time had come to renew the fleet of machines and he made a radical decision to change to a different manufacturer. "Why do I prefer Solomat? Because of the good reputation of its customer service. At first, the thing that impressed me even more than the R 954 C was the L 566 wheel loader. The drivers were quickly accustomed to the hydrostatic travel drive and greatly appreciated the simple controls and the ergonomics of the cab."

High productivity in the test operation was decisive for the purchase.
His drivers agree with him. “Initially I found the driving response of the machine difficult to command due to the hydrostatic system. But now I find it efficient and reliable,” explains Jean-Louis Cheminet. Pascal Larpin quickly got used to his new machine. He especially appreciates the comfort in the cab and the simple changeover from a standard steering wheel to steering with a quarter turn. Hervé Goutron was already familiar with the hydrostatic drive. He attaches great value to the fluid and sensitive controls and the great stability that counter the development of fatigue. “And if necessary, the technician from Solomat is close by.”

“When I was planning the renewal of my fleet of machines, the R 960 SME had just been launched,” Christian Mazière remembers. “Compared to the R 956 HD, its components have been greatly reinforced, and it was launched at exactly the right moment.” Responding to customer wishes is also important. “I requested two improvements: an HDV backhoe bucket with 3.55 yd³ and side catwalks to make it easier to service the excavator. I had to fight to get the backhoe bucket, but compared to its competitors it makes a vast difference in productivity.”

The result was better than expected
In order to justify the additional cost of his choice of machine to the company management, Christian Mazière conducted an investigation. “The excavator is a decisive factor for productivity. The size of the R 960 SME, its power and its speed when loading trucks, enabled my operation to deliver more tons per day at lower cost per ton. The investment in the R 960 SME has paid off. The end result is even better than expected.” After 1,000 operating hours, the operations manager speaks highly of the machine.

“The R 960 SME allows my operation to deliver more tons per day at lower cost per ton.”

Christian Mazière, director of the feldspar quarry at Montebras
"The excavator is very well balanced in its work, and extremely stable. Its power guarantees good digging force and it is faster than the R 954. After ten loading cycles, there is a productivity increase of 20 percent between the two models – and fuel consumption is the same."

**Ambazac attains qualification for C2 gravel**
The quarries at Ambazac are the heart of the Les Pierres d’Ambazac Holding, which was founded in 1976 by the father of the current company manager, Jean-Roger Delanne. Jean-Roger Delanne has been working for the company since 1980, taking over management responsibility initially with his brother, and then by himself in 2000.

In the coming years he is planning to invest in replacements for three large crawler excavators and two wheel loaders. "We shall request an undertaking from Liebherr with respect to efficiency and availability. The excavator in the quarry is the first link in our production chain. From Liebherr, I expect the assured efficiency of 92% operational availability from the first year, never dropping below 85%." A request that the manufacturer is happy to fulfill.

**Imerys Ceramics France: feldspar from Montebras**
The feldspar quarry and plant at Montebras are part of Imerys Ceramics France, a world market leader for industrial minerals. Imerys Ceramics is part of the Ceramic Materials division of the Imerys Group. The Group employs 16,000 people in 47 countries. Quarrying takes place over ten months, where by 50% of the volume produced is delivered to Italian tile manufacturers. The feldspar is used primarily to manufacturer large format and “super white” tiles. Other customers are located in France, Germany and Poland.

Even though a railway line is present on site, the entire production is now transported by road. “Sixty percent of the production volume used to be shipped by rail, until 2011, when SNCF..."
discontinued the service. Apart from the environmental impact, that is a cost factor that we cannot neglect. One train can take 45 articulated trucks off the road," Christian Mazière complains.

The quarry is split into two sectors: the quarry itself and the area for preparation and shipping. Blasting operations have been outsourced to the company Alpharoc. Within the quarry, the material is transported by Dumont TP with two articulated trucks of the 50-ton class.

The R 960 SME is primarily used for loading after every blasting. If necessary, excessively large blocks are made smaller by a Liebherr R 924 crawler excavator fitted with a hydraulic hammer. The dumpers secure replenishments for a buffer stock of 11,000 tons in front of the crusher. That allows the R 960 SME and the two dumper trucks to be used for spoil work when this is needed. The crusher used is a hammer crusher, with two gyroratory crushers attached to produce a 0/8 grain. Depending on the customer's specifications and to guarantee constant homogeneity of production, a chemical test is conducted internally of various batches of material. These batches are then mixed and put into stock until they are shipped. 

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Company profile

**Carrières d’Ambazac**

- **Sector:** Quarrying of construction materials
- **Size of company:** 45 employees
- **Founded:** 1973
- **Location:** Ambazac (87)
- **Managing Director:** Jean-Roger Delanne
- **Website:** [www.novapierre.com](http://www.novapierre.com), [www.carrieres-ambazac.fr](http://www.carrieres-ambazac.fr)
- **Liebherr machines in operation:** L 550, L 566, L 580, L 586, P 724, PR 724, R 936, R 944 C

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Company profile

**Carrière de Montebras**

- **Sector:** Mineral raw materials for the ceramics industry
- **Size of company:** 11 employees
- **Founded:** 1859
- **Location:** Soumans (23)
- **Managing Director:** Christian Maziere
- **Website:** [www.imerys-ceramics.com](http://www.imerys-ceramics.com), [www.carrieres-ambazac.fr](http://www.carrieres-ambazac.fr)
- **Liebherr machines in operation:** R 960 SME, R 924 with hydraulic hammer, 3 L 566 wheel loaders

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The drivers especially appreciate the simple controls of the wheel loaders.
The retarder is a form of continuous braking system and makes it possible to decelerate over an extended period without a significant loss of power. It comprises two opposing vane wheels within a converter housing: the rotor, which is connected to the vehicle’s drive train and thus rotates, and the stator, which is permanently fixed to the converter housing. When needed, oil is fed into the converter housing and accelerated by the rotor. The centrifugal force presses the oil into the stator, braking the rotation of the oil and feeding this back into the rotor. The result is that the rotor and the connected drivetrain are braked.

This allows safe braking, especially on long downhill stretches, relieving the load on the service brake. Thanks to the retarder, the service brake remains cold. This prevents fading due to heat buildup, while retaining the full braking effect of the service brake. Besides this important safety aspect, the service life of the service brake is also substantially prolonged by the active use of the retarder.

Fundamentally, all retarders work in a similar way to this. However, the retarder in the TA 230 articulated truck has a number of special features.

Driver, load and gradient have a fundamental influence on the brake performance. If there are only fixed retarder levels, the retarder will always provide either too much or too little braking effect. Taking a look at the dashboard of the TA 230, the small lever on the left of the gear lever is conspicuous. This lever is used to freely vary the retarder setting from 0 % to 100 % efficiency. That way, the required braking effect is always achieved. There is no need for compromise.

As soon as the driver takes his foot off the accelerator pedal, the required retarder setting immediately takes effect on the last angle setting of the accelerator pedal.

By contrast to other machines, there is no time lag in the start of deceleration. In addition, the braking effect of the retarder is also supported by the engine brake. This brake is upstream of the retarder and becomes effective slightly earlier. The engine brake in the TA 230 is especially effective because alongside the engine brake flap, the compression of the piston is also exploited optimally for the braking effect. This patented process increases the braking effect by about 40 % compared to that of a conventional engine brake.

Together, the freely variable control of the retarder and the high efficiency of the engine brake provide an enormous advantage with respect to safety, efficiency and comfort.

The engine brake in the TA 230 Litronic dump truck has 40 % higher braking effect compared to conventional brakes.

The lever on the far left allows the retarder setting to be freely adjusted.
Reliance and partnership for safe quarrying

Even as a child, Roberto Zanotto knew that mining was in his blood. 20 years ago he came to Brazil to set up a site near São Paulo. For his new company, Geocal Mineração, he bought the first hydraulic excavator with backhoe attachment in the country from Liebherr. Now he looks back on the interesting developments that have accompanied the enormous growth of the country. The company today turns over 551,000 tons of material a month, and nearly the entire quarry operation is done with Liebherr machines.

Geocal Mineração quarry is located about 25 miles away from the capital of São Paulo. It was founded in the municipality of Santana de Parnaiba. The quarry was set up by Roberto Zanotto, an Italian citizen who settled in Brazil in 1994, the company’s founding year. Geocal Mineração handles with the entire mining process at a quarry, from the extraction at the limestone mine to the delivery of by-products such as sand, crushed stone, concrete and agricultural limestone.

Geocal is a family owned company. It is also part of the Zanotto Group, with a strong presence in Italy. Roberto Zanotto says that he grew up near a mine in the Veneto region of Italy. Therefore, mining is in his blood.

When he chose to bring the Group’s business activities to Brazil, Roberto Zanotto found a country undergoing a serious transformation. Brazil went through an economic reform aimed at controlling the inflation that had paralyzed the country for at least eight years, with figures higher than 1,000% a year. Still under the shade of instability, Roberto Zanotto saw in Brazil a country of opportunities. “When we arrived in Brazil, we saw a number of things yet to be done for the country’s development, such as infrastructure, highways and sanitation. We saw then an opportunity to participate in this country’s growth. It is now 20 years later and there is still a lot to be done,” says Zanotto.

He purchased the quarry that had been shut down since 1968, the Cal Matarazzo. Relying on the experience he had acquired in Italy, Roberto Zanotto got in touch with Liebherr, a reliable equipment supplier who had excellent references. And this is how the partnership which has been in place for nearly 20 years was set up. Zanotto bought the first hydraulic excavator with backhoe attachment in the country from Liebherr for Geocal Mineração.

It was a Liebherr R 944, bought in 1995. The most common use of hydraulic excavators at that time in Brazil was the shovel attachment. Geocal was also the first company to buy a wheel loader produced in the country, the L 574, predecessor of the model dedicated to the Brazilian market for quarrying – the L 580.

At the plant located in Santana do Parnaiba, Geocal operates along the entire limestone production chain. In addition to the quarry, the company also has three stone crushing plants, one of them being portable. Stone crusher number 1 focuses on grinding agricultural limestone and, as a by-product, generates aggregates for civil construction. Stone crusher 2 produces sand and also uses the by-product for civil construction. Stone crusher 3 focuses on quartz production. Altogether, the three plants have a production capacity of 253,532 tons per month.

The mine limestone provides the quarry with a range of working possibilities: In addition to being a supplier for civil construction, Geocal works heavily in agricultural corrective agents, which are used to correct the acidity of the soil and provide nutrients such as calcium and magnesium to improve the site. This product accounts for 50% of the company’s invoicing.

The company turns over approximately 551,000 tons of material a month, from limestone to sterile material. The fleet consists of ten hydraulic excavators, six wheel loaders and 30 off-road trucks. Almost the entire quarry operation is done with Liebherr machines: one R 944 B and one R 944 C crawler excavator, four R 954 C and one R 964 C. Hydraulic excavators are used in quarrying. Three L 580 wheel loaders and one L 538 wheel loaders are used for movements at the yard. At this same site, the company has a Concrevit concrete plant that uses 120 Liebherr
concrete mixer trucks. Concrevit also relies on a subsidiary in Rio de Janeiro, which operates with three more Liebherr R 944 hydraulic excavators and four L 580 wheel loaders.

The Geocal plant in Santana de Parnaíba currently turns over approximately 27,550 tons of material a day, in two 9-hour working shifts. The Liebherr equipment operates nearly non-stop during these shifts. The machines are refilled with gas inside the mine by a convoy of trucks. This leads to reduced downtime and enhanced productivity.

"Liebherr equipment never caused any problems, and I have no complaints about unscheduled downtimes."

Roberto Zanotto, founder and managing director

Zanotto also says that he uses the machines to their exhaustion: “The first loader we bought operated for about 25,000 hours.” Compared to the miles a car runs, this figure is equivalent to approximately 93,205 miles. To Zanotto, it is difficult to find skilled manpower in Brazil to work with the machines. Therefore, he invests in his employees and, whenever possible, uses Liebherr’s training center in Brazil.

Safety is another important factor for the operations at Geocal. The quarry pit is very deep – approximately 492 feet deep – and features very narrow benches that require the equipment to operate within a very tight radius. The Liebherr excavators offer a high level of safety, as the weight is ideally distributed so the machine does not swing when operating in the mine. “As the benches are quite narrow, the comfort and safety that Liebherr excavators provide the operators are incomparable,” says Silviano Salazar, Geocal’s mine manager.

Geocal has forward-looking plans and sees Liebherr as a partner for that. The company’s projects are oriented to the diversification of the quarry activities, such as the investment planned for this year in the production of filler, which is the limestone powder used as mortar additive. Zanotto sees growth opportunity in the special sand segment, as sand is a base product for civil construction, and due to environmental laws, it is getting more and more difficult to meet product requirements. Roberto Zanotto concludes: “We want to diversify, but we need to be specialists in what we understand: raw material production. This is our target for the future.”

Company profile

**Geocal Mineração**

- **Sector:** Quarrying
- **Size of company:** 1200 employees
- **Founded:** 1994
- **Location:** Santana de Parnaiba, Brazil
- **Managing Director:** Roberto Zanotto
- **Website:** www.geocal.com.br
- **Liebherr machines in operation:** L 538, L 580, R 944 B, R 944 C, R 954 C, R 964 C
J Swap Contractors in New Zealand: Efficiency in heavy operations

What started in 1934 as delivering shoveled riverstone to local customers, ended up becoming a company supplying over 2.2 million tons of material from ten aggregate quarries per year. Now, 80 years later, J Swap is one of the top aggregate producers in New Zealand. Among other Liebherr wheel loaders the largest hydrostatically driven wheel loader in the world, an L 586, is used to cope with the heavy loads in the 100% family-owned quarrying business.

It all started in 1934, when Joe Swap, the father of today's managing directors David and Lewis Swap, shoveled riverstone from a river at the back of his dairy farm in Te Poi in the central North Island of New Zealand. He put the material onto a 1930s Ford truck and delivered the aggregate to local building sites and farms. This was the starting point of his commercial activities.

Today, almost 80 years later, the company is one of the top aggregates producers and a leading dairy stockfood supplement distributor in New Zealand. The company has regularly added new business areas as opportunities have arisen. Many rural customer relationships that started in the 1930s are still on-going under the direction of Joe's sons David and Lewis.

Besides them, the fourth generation has already started working for the company. Joseph, who is Lewis’s eldest grandchild, is already very active in the family-owned business. “When you’re part of a fourth generation business it’s in your blood,” Joseph Carter says. The family members are always on the go, either to one of their ten aggregate quarries, four stockfood storage facilities or six agricultural farms. Next to quarrying, stockfeed and bulk storage they are also active in the contracting and heavy haulage business – supported by their 380 employees.

Fuel economy: Keeping the environment green

“New Zealand is fortunate to have a clean green environment and we want to keep it that way,” Lewis Swap says. “We work in an industry that is important to New Zealand’s economy but could be seen as environmentally challenging. We give special attention to managing our environmental impact. Fuel economy is the first step to do so.”

Nevertheless, powerful machines are needed to cope with the heavy loads as in the quarry business. Over 2.2 million tons of material is supplied from the ten aggregate quarries per year. Thousands of tons of crushed aggregates have to be handled by the company’s wheel loaders per year. Five large Liebherr wheel loaders are operating in the company, three L 586 and two L 556. The big machines are mainly used for bulk material handling and are equipped with L5 tires. For general works, forestry and maintenance, the L 556 is used. All the machines are operating fifteen hours a day without a break.

“We bought our first Liebherr machines three years ago. In 2013 we bought another L 556 and an L 586. The machines turned out to be satisfying in terms of capacity and economy,” Lewis Swap says. “What is especially striking is the L 586. Although

- Capacity and economy were the crucial factors for the management to buy Liebherr wheel loaders.
these are huge machines, they are burning less fuel than the loaders they replaced. This fuel economy saves money for the company, but also reduces CO₂."

“Although these are huge machines, they are burning less fuel than the loaders they replaced.”

Lewis Swap, managing director

Liebherr has been driving forward the development of wheel loaders with low fuel consumption for decades. On average the wheel loaders now require up to 25 percent less diesel compared with other wheel loaders of the same size. This reduction in fuel consumption removes a massive amount of pollution from the environment. As a comparison, 0.3 gal of fuel produces up to 7 lb of carbon dioxide (CO₂). By saving up to 1.3 gal per operating hour, up to 33,070 lb less CO₂ is produced in 1,000 operating hours.

Wheel loaders: 551,000 tons stockfood per year
The L 556 wheel loaders are also used in the company’s stockfood division. J Swap imports, stores and delivers approximately 551,000 tons of stockfood per year. The stockfood supplement includes things like palm kernel expeller, coming mainly from Indonesia or Malaysia, wheat bran pellets, crushed barley, dried distillers grain and many more.

J Swap’s own fleet of trucks unload the stockfood coming to New Zealand by ship. They then cart them to the bulk storage facilities based around New Zealand. This is when the company’s wheel loaders start doing their job – processing the stockfood to its destination either placing it in storage or making it ready for transportation to the farm. “When it comes to loading we need to act very fast”, says David Swap, “the Liebherr wheel loaders have the necessary power to accelerate this process.”

Company profile

**J Swap**

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<th>Sector:</th>
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<tr>
<td>Managing Director</td>
<td>David and Lewis Swap</td>
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<td>Website:</td>
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Liebherr machines in operation:
L 556, L 586
Third-generation stone quarries

Like grandfather, like father, like son. The Lanwehr family has been quarrying limestone at Arnsberg-Müschede in North Rhine-Westfalia since 1963. Production is now about 4400 tons per day. With 12 employees, the company managed by Thomas Lanwehr produces around 1.1 million tons of fine grit and mixtures for the construction industry. Three years ago, Lanwehr completely replaced all its dump trucks and dumpers with a 2,300-foot conveyor belt system.

The family business was founded in Warendorf in 1936 by Hermann Lanwehr. The quarry business was added in 1963. The quarry mines hard limestone with approximately 45% calcium, which even today is still extracted using a blasting process in the berm system. Lanwehr produces high-quality materials for road construction. For several decades, the company has been renowned as a reliable partner of the construction industry, one that stands for quality products and a broad range of aggregates for the concrete industry and for road construction. The main customers, such as asphalt mixing plants and concrete works, are based primarily in the nearby Ruhr and Münsterland regions.

In 2010, Thomas Lanwehr extensively restructured the company. He explains the background. “Our quarry face is about 2,300 feet from the final processing point and from where the goods are loaded onto the customers’ trucks. We used to cover that distance with dump trucks, later with dumpers. That represents an enormous expenditure for investment, operating and personnel costs. Three years ago, I changed all that and purchased a three-section conveyor belt system. The material is now transported out of the pit via several layers. The final processing machines also used to be located closer to the face, but that meant our customers had to drive too far down to the quarry. Today, we sometimes have 60 trucks come at once. That can cause congestion on our access roads.”

Managing Director Thomas Lanwehr has restructured the process at Lanwehr Naturstein.
The road to the quarrying site runs parallel to the conveyor belt system, which ends at the base of the 328-foot-high face of dark limestone with layers of white quartz. “We perform blasting here about every four weeks, depending how much material the blasting has produced,” explains Lanwehr. “When we are blasting, we always work from the top down. Our berms, that is ridges on the face, are only about 33 feet wide. That means most of the material drops down to the bottom. What does remain on the berms has to be cleared away by a compact excavator. From the pile formed by blasting, we pick the material up with the crawler excavator and put it into the crusher here. The mobile hammer crusher has an operating weight of 110 tons and grinds 440 tons of rock per hour, feeding it onto the conveyor belt system.”

The conveyor belt runs continuously for up to ten hours a day. At the top of the pit, the material takes different paths and is moved into two silos for preliminary sieving. It is split into 0/32 and 32/250 grades. The sand-free fraction goes into system 1, which manufactures 14 different grades of fine grit. The rest goes into system 2, where water is added to bond the sand. Another eight products are manufactured here.

The different products are put into temporary stock in piles, where they are directly loaded onto the customers’ trucks. Here, Thomas Lanwehr places his trust in Liebherr wheel loaders. “We attach great importance to low fuel consumption, and in that respect there is simply no alternative to Liebherr.”

“We attach great importance to low fuel consumption, and in that respect there is simply no alternative to Liebherr.”

Thomas Lanwehr, managing director

great importance to low fuel consumption and in that respect there is simply no alternative to Liebherr. The wheel loaders really are unbeatable. Liebherr machines have reduced our fuel consumption in loading by 35 – 40 percent. We purchased the first L 580 for the quarry just after it was launched, and just two weeks ago we took delivery of the latest machine. Between them, we have had several Liebherr machines working here, and we haven’t had any problems with any of them. Working in two shifts, we operate about 3000 hours per year and machine – a little less in the winter, a little more in the summer. We replace our machines about every three years.”

“We working time is also a very important criterion. We have a shovel with maximum volume on the L 580 and that works without problems. The Liebherr machines have an excellent tipping load. What is important for us is to load the trucks as quickly as possible – at most three load cycles, then it should be full, but not too full. For this reason, the wheel loader has built-in scales. That tells the driver exactly how much he has loaded onto the truck. That is very important, not least to make sure that the lorries are not overloaded. If that were the case, they would have to come back after being weighed to tip some of the load off. That would be rather laborious and far too time-consuming.

“The other thing that always strikes me is the fact that Liebherr wheel loaders are extremely quiet. The new L 580, for example, is practically noise-free. Open up the throttle and you hear simply nothing – certainly not any noise from the engine. That was one reason why we turned to Liebherr in the first place. While we still had a construction contractor in Warendorf, we had to fulfill strict conditions regarding noise emissions because the company was based within a mixed industrial estate. At the time, Liebherr wheel loaders were the only machines that enabled us to come under the specified limits. Of course, we no longer have that problem here in the quarry. But still, noise means stress for the people who work here, so every machine that runs quietly is a benefit. We like to make sure that our employees can enjoy good working conditions. For example, our wheel loaders are equipped with climate control and with ventilated and heated seats.”

Thomas Lanwehr summarizes his experience with Liebherr machines. “Let me put it this way. If it proves successful, it will remain. You can see that with our operations. And that includes our many years of loyalty to Liebherr.”

Company profile

Lanwehr Naturstein GmbH + Co. KG

Sector: Quarry operator
Size of company: 12 employees
Founded: 1936
Location: Head office at Arnsberg-Müschede, Germany
Managing Director: Thomas Lanwehr
Website: www.lanwehr-naturstein.de

Liebherr machines in operation: 2 L 580 wheel loaders
Liebherr machines in quarrying

Liebherr machines are used in a variety of quarrying operations. Excavators, wheel loaders, crawler tractors and articulated trucks work with enormous power and yet low fuel consumption. That means they make it possible to work economically in quarrying.

In Colmar, France, Liebherr manufactures crawler excavators weighing between 20 tons and 110 tons. Every crawler excavator is perfectly tuned to the requirements that await it in practical operation. The machines are subject to a continual improvement process to increase productivity and economy.

With all crawler excavators, the driver can choose any of four operating modes. The mode preselection switch adapts the engine and hydraulic power to the operating conditions encountered, for example, for maximum digging performance in heavy-duty operations or for maximum economy and minimal environmental impact. The “E-Economy” mode for economical, eco-friendly working is recommended for normal working conditions. The excavator is equipped with a reinforced under carriage featuring under carriage components from the next model up in the product range. In conjunction with a greater ballast weight, these improve the stability of the machine, even with a larger bucket volume. The equipment has been adapted to allow for higher tearout and breakout forces. The bottom line is that these measures enhance the performance and economy of the excavators. SME excavators are available worldwide with III A / Tier 3 or III B / Tier 4i engines.

The wheel loaders are manufactured in Bischofshofen, Austria. They achieve maximum turnover rates with low operating costs. With the combination of Liebherr travel drive and the advantageous installation position of the diesel engine, the machines achieve high tipping loads, which increases productivity.

The machines consume up to 25% less fuel than conventionally powered wheel loaders. The basis for this is the drive concept. The hydrostatic travel drive allows the Liebherr diesel engine to be installed at the rear. Compared to conventionally driven wheel loaders, this leads to a higher tipping load with considerably lower operating weight and a higher turnover rate per hour of operation. The travel drive automatically adjusts the tractive force and speed to the requirements of the quarrying operation. This reduces tire wear by up to 25% and brake wear almost completely.

Large wheel loaders such as the L 586, currently the world’s largest hydrostatically powered wheel loader, are primarily used in the quarrying industry. For all machines, there is a range of equipment options available that are needed for the intensive operations encountered in the quarrying of raw materials. These include rock and rehandling buckets and special tires for use in quarrying. The cab is noise insulated as standard for safe and comfortable working; non-slip step surfaces and stable hand rails provide additional safety. The freely adjustable control lever, which is produced in-house, is fitted as standard. The same thing applies to the rear-view camera (on the L 550 to L 580) and the steel fuel tank. Optionally, a protective grille can also be selected for the windscreen or a protection for the tilt cylinder.

Power and innovative technology are the hallmarks of the crawler tractors built in Telfs, Austria. Whether they are used for tough digging operations or shifting heavy material, the PR 754 and PR 764 impress in all operations with their outstanding performance and economy.

Liebherr machines are used for various applications in the quarrying industry.
To mechanically dig and break out hard rock, high penetration and pushing forces are required. The Liebherr crawler tractors PR 754 and PR 764 offer the ideal prerequisites with their 44 and 55 ton operating weights in conjunction with the innovative hydrostatic drive concept. Transmission of the engine power is constant through a positive connection without slip via both tracks, which means that the material is worked loose evenly and efficiently pushed away.

The latest generation Liebherr diesel engines combine high performance with frugal operation. Thanks to the consistently low engine speed, fuel is saved and a high service life of the components is achieved. Additional clear economical advantages speak in favor of Liebherr. As with all Liebherr equipment, the PR 754 and PR 764 models also benefit from being user-friendly. This reduces maintenance costs and downtime.

Tough and sturdy, Liebherr crawler tractors are configured for long life time in terms of construction and material quality. Parts that are subject to particularly heavy loads are made of very strong materials, and sensitive areas are optimally protected. All of these factors make Liebherr crawler tractors reliable machines with the highest level of availability.

Liebherr crawler tractors offer operators a generously proportioned workspace, designed with the latest ergonomic aspects in mind. The spacious and comfortable cabin enables an optimal overview of the working area and the work equipment. With the intuitive single joystick control, the machine can be controlled deftly and safely at all times.

The articulated trucks are manufactured in Kirchdorf, Germany, and are designed for maximum efficiency and reliability. Key components are manufactured in-house to ensure consistently high quality and durability.

The TA 230 Litronic achieves fast turnover rates with its intelligent drive concept. Simple transportability enhances the machine’s flexibility, increasing its workload. Maintenance-free bearing points and optimally accessible service points reduce maintenance costs and downtimes.

The TA 230 Litronic features proven Liebherr components, such as its diesel engine, hydraulic cylinder, ball slewing ring and our own electronics. This means the machine is ready for the tough operations encountered in quarrying and responds with absolute operational reliability and high availability.
The production sites for Liebherr quarrying machines

**Crawler excavators**
Liebherr-France SAS
Colmar (France)

**Dumper trucks**
Liebherr-Hydraulikbagger GmbH
Kirchdorf an der Iller (Germany)

**Hydraulic excavators, wheel loaders**
Liebherr Machinery (Dalian) Co., Ltd.
Dalian (China)

**Crawler excavators, wheel loaders**
Liebherr Brasil Ltda.
Guaratinguetá (Brasil)

**Crawler tractors**
Liebherr-Werk Telfs GmbH
Telfs (Austria)

**Wheel loaders**
Liebherr-Werk Bischofshofen GmbH
Bischofshofen (Austria)