
R 9100

Job report: Mining excavator

The Liebherr R 9100 excavator
TBEA mine in Xinjiang, China

LIEBHERR

Mining excavator



Situation



China



The largest open cast coal mine in Xinjiang, China, operated by the Liebherr customer XINJIANG JINRUI ZHONG-YAN and owned by TBEA, has a reserve of 12.6 billion tons and an annual production of 30 million tons. Guaranteeing to the region a complete control over industrial capabilities, the mine contributes not only to electricity distribution and electronics production but also to the manufacture of new aluminum or polycrystalline silicon.

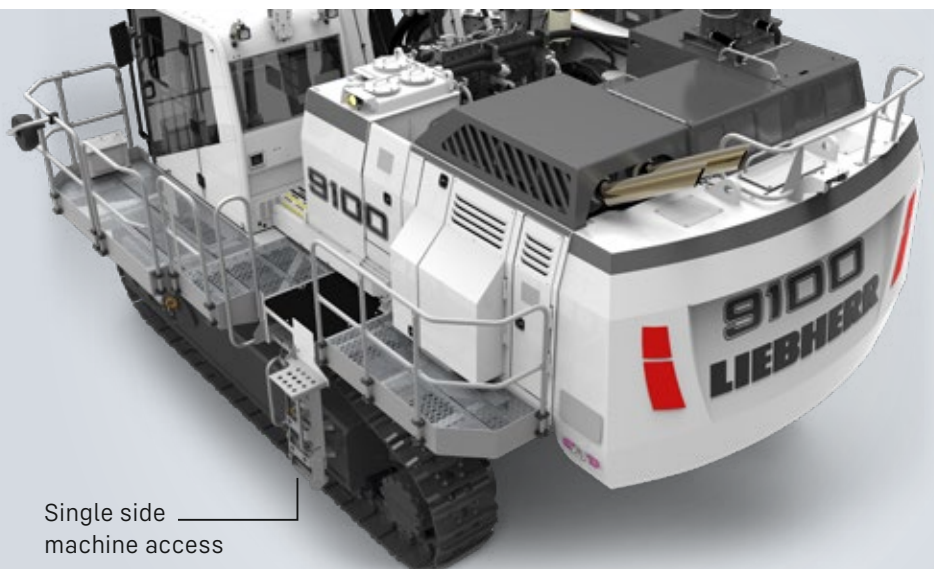
With steady investments over the last years, TBEA and the contractor have worked together to increase their production capacity, taking into consideration the possible future developments of the recycling industry. Looking for productive and reliable machines, the first R 9100 was commissioned in 2019, after having been convinced by a unit exhibited at the BAUMA Shanghai in November 2018.

R 9100 performances

In production since 2009, a new generation of Liebherr 100 t class mining excavators have been upgraded in 2019. Delivering improved performance, productivity, safety and comfort, more than 150 units have been sold worldwide in 2020. Integrating the Liebherr D9512 engine, the R 9100 offers fast cycle time with precise machine

motions, but also provides high digging forces thanks to a power-oriented energy management. Using a closed loop swing circuit, the R 9100 hydraulic system is efficient and allows operator to move more with less fuel. Equipped with advanced machine monitoring, the R 9100 maximizes productivity without compromises.

- Operating weight**
113 tonnes / 125 tons
- Motor output**
565 kW / 757 HP
- Bucket capacity**
7.5 m³ / 9.8 yd³
- Max. digging force (ISO 6015)**
415 kN
- Max. breakout force (ISO 6015)**
560 kN
- Max. oil flow**
2,160 l/min



Production estimate

Test result

| | R 9100 (7.5 m ³ / 9.8 yd ³) | R 9100 (8.1 m ³ / 10.5 yd ³) |
|--|--|---|
| Truck model | Cat 777 E | Cat 777 E |
| Average load per truck | 91 t / 100 tons | 91 t / 100 tons |
| Truck exchange time | 45 sec | 45 sec |
| Cycle time | 20 sec | 20 sec |
| Cycle per truck | 9 | 8 |
| Average loading time per truck | 2 min 40 sec | 2 min 20 sec |
| Production per hour (@efficiency 85.5 %) | 1,459 t / 1,608 tons | 1,553 t / 1,711 tons |

Tailor-made buckets

Typically used in Xinjiang to remove overburden of the coal mine, the R 9100 was first delivered with a standard 7.5 m³ bucket (exhibition machine). When the machine was commissioned, the Liebherr Application Engineer ran on-site production tests and concluded that the bucket size could be increased without exceeding machine capacity, cycle time or durability. Liebherr engineers dedicated team to bucket design developed a custom-made 8.1 m³ bucket to satisfy customer requirements. Bigger and wider than before, it ensures optimal machine productivity.

This unique OEM capability allows operators to maximize each pass, which allows operators to load trucks with **eight** passes instead of nine. Combined with unrivaled cycle times, this bucket improvement increases production per hour by 6.4 %, which represents an approximate annual production increase of 597,000 t / 658,080 tons.



Competitive comparison

In China, Liebherr machines are more and more in competition with national players. Facing strong rivalry in Xinjiang, the R 9100 is challenged by XCMG XE1250 machines. However, thanks to lower cycle times and better bucket

capacity the Liebherr R 9100 provides unrivaled competitive advantages. Combined with higher productivity, proven fuel efficiencies ensure stable savings and competitive cost per ton, compare to the XCMG XE1250.

Test result

| | R 9100 (8.1 m³ / 10.5 yd³) | XE1250 (7.6 m³ / 9.9 yd³) |
|--|---|--|
| Truck model | Cat 777 E | Cat 777 E |
| Average load per truck | 91 t / 100 tons | 91 t / 100 tons |
| Truck exchange time | 45 sec | 45 sec |
| Cycle time | 20 sec | 22 sec |
| Cycle per truck | 8 | 9 |
| Average loading time per truck | 2 min 20 sec | 2 min 55 sec |
| Production per hour (@efficiency 85.5 %) | 1,553 t / 1,711 tons | 1,372 t / 1,512 tons |
| Engine | D9512 | QSK23 |
| Net power | 565 kW | 567 kW |
| Displacement | 24.24 l | 23.15 l |
| Nb. of cylinder | 12 | 6 |
| Specific consumption (@load factor 80 %) | 95 l/h | 112 l/h |
| Specific CO ₂ emissions (@load factor 80 %) | -15 % | +18 % |

Hydraulic efficiency

When designing a machine, Liebherr particularly focus its development on efficiency. Thus, constant power regulations of the hydraulic systems and the engine output optimize the R 9100 global fuel efficiency.

Optimized fuel consumption

Because the Liebherr D9512 engine has a lower specific consumption, the R 9100 burns less fuel and has fewer gas-related emissions, compared to the XE1250.

High performances

Liebherr engineers have worked to reduce the power consumption of auxiliary pumps, providing a higher capacity for digging performance. Everything is taken into account to deliver state-of-the-art mining excavator performances and best productivity.

Cost of fuel / h

- 22 %

Tonnes / h

+ 13 %

L / Tonnes

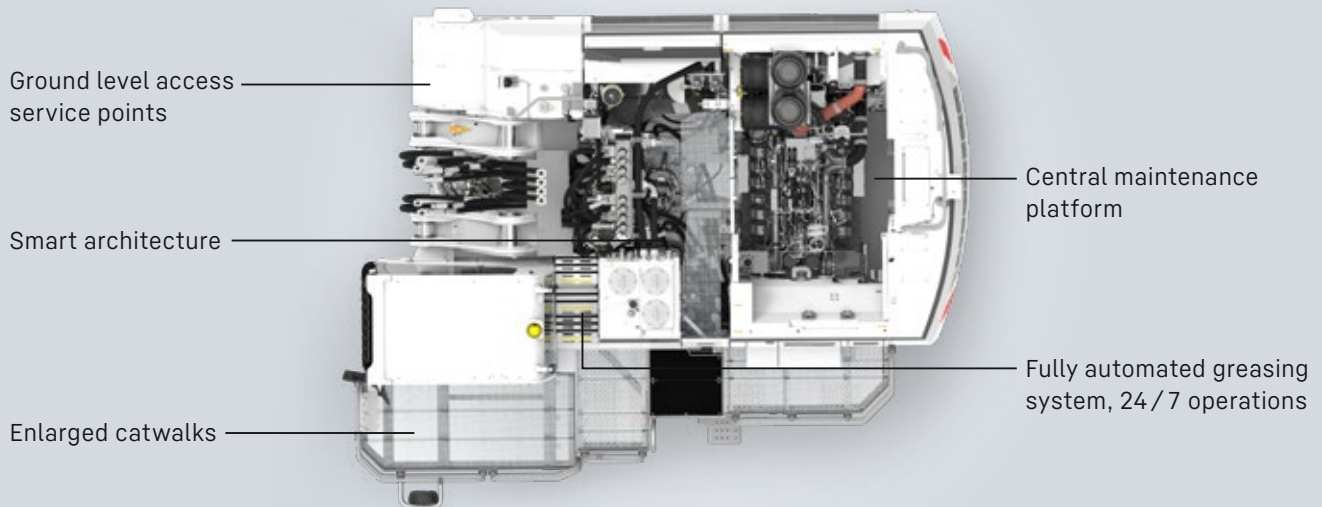
- 27 %

Annual production

+ 1,159,000 t

(1,277,578 tons)

Optimized serviceability and accessibility



Heavy-duty attachment

The R 9100 attachment has been designed to provide efficient force distribution. Its architecture, combined with its smart pipes layout, work together to generate powerful hydraulic transmission. With 415 kN of digging force (ISO 6015) and 560 kN of breakout force (ISO 6015), the Liebherr machine guarantees steady and productive work.

Comfortable and safe working environment

The R 9100 cabin guarantees less vibrations and noises. Combined with armored front and right windows, the cabin ensures operator safety. Standard rear and side cameras provide optimal visibility while guaranteeing safety around machine. As a standard feature, extensive use of LED lights in combination with mirrors offer permanent 360 vision, even at night (ISO 5006).





Opportunities

The Liebherr R 9100 offers unrivalled productivity and efficiencies, allowing the machine to stay highly competitive against domestic machines, even as an imported product subject to custom shipping duties. In an environment where reducing cost per ton is the top priority, the greater capital expenditure of the R 9100 is widely compensated by lower operational expenditures and superior production capabilities.

Regarding this positive outcome, in 2020 the Liebherr customer XINJIANG JINRUI ZHONGYAN ordered four additional R 9100 excavators to their fleet, and decided to increase even more their production output with three Liebherr R 9150 excavators. Liebherr is currently in discussion with this customer regarding additional Liebherr machines for their fleet, with goal of contributing to the mine's future production and transition into electric powered excavators.

Subject to technical modifications. All comparisons and claims of performance are made with respect to the prior Liebherr model unless specifically stated.

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