SOFTWARE & TECH

Mining Truck T 282 B Liebherr 21382

PUBLISHED
November 25, 2026

REFERENCE
#1795583299830738

Introduction to the Mining Truck T 282 B Liebherr 21382

The mining industry relies on heavy equipment that can withstand extreme conditions and deliver unmatched performance. Among the giants that roam open-pit mines, the **Mining Truck T 282 B Liebherr 21382** stands out as a marvel of engineering and productivity. This ultra-class haul truck, manufactured by the renowned German-Swiss company Liebherr, has set benchmarks for payload capacity, fuel efficiency, and durability. The specific serial number 21382 denotes a particular unit that exemplifies the rigorous quality and advanced technology embedded in the T 282 B series. With a payload capacity of 363 metric tons (400 short tons), it is designed to move vast quantities of material efficiently, reducing costs per ton for mining operations worldwide. This article delves into the features, performance, and innovations that make the Mining Truck T 282 B Liebherr 21382 a cornerstone of modern mining fleets.

Design and Structural Excellence of the T 282 B

The Liebherr T 282 B is not merely a larger version of its predecessors; it is a completely reengineered platform that integrates advanced materials and computer-aided design. The **Mining Truck T 282 B Liebherr 21382** features a robust box-frame chassis made from high-strength steel, which provides exceptional torsional rigidity while minimizing weight. This design allows the truck to carry its maximum payload without compromising structural integrity on uneven mine roads.

Powertrain and Propulsion System

At the heart of the T 282 B lies a diesel-electric drivetrain. The engine is typically a 20-cylinder MTU or Cummins power plant that generates around 3,000 to 3,500 horsepower. This engine drives an alternator that supplies electricity to the rear-wheel traction motors. In the case of the **Mining Truck T 282 B Liebherr 21382** , the diesel-electric system offers significant advantages over mechanical drivetrains:

- Higher efficiency: Electric motors provide instant torque, reducing mechanical losses.
- Regenerative braking: During descent, the electric motors act as generators, slowing the truck and charging the grid (or resistors) while saving brake wear.
- Smoother operation: The absence of a heavy transmission and torque converter reduces stress on components.

The truck uses AC (alternating current) drive technology, which further improves reliability and control. The IGBT (Insulated Gate Bipolar Transistor) inverters ensure precise modulation of power to the wheels, enhancing traction on slippery or steep terrain.

Payload Capacity and Body Design

The **Mining Truck T 282 B Liebherr 21382** features a lightweight yet durable dump body made from abrasion-resistant steel. The body's shape is optimized for material retention and quick dumping, with a heaped capacity

of around 222 cubic meters (290 cubic yards). This allows mines to achieve high fill factors, reducing the number of cycles needed to move overburden or ore. The payload management system continuously monitors load weight, preventing overloading and ensuring compliance with safety regulations.

Performance Metrics and Operational Efficiency

In daily operation, the **Mining Truck T 282 B Liebherr 21382** delivers impressive speed and cycle times. With a maximum speed of 64 km/h (40 mph) when loaded and faster when empty, it can keep up with other ultra-class trucks in the fleet. The truck's powerful engine and drivetrain allow it to climb gradients of up to 10-12% while carrying a full load, which is critical in deep pit mines.

Fuel Consumption and Environmental Considerations

Fuel efficiency is a key metric for any mining operation. The diesel-electric architecture reduces fuel consumption by up to 10% compared to similar mechanical-drive trucks. The **Mining Truck T 282 B Liebherr 21382** can be equipped with engine management systems that optimize fuel injection and idle reduction. Additionally, Liebherr offers optional exhaust after-treatment systems to meet Tier 4 Final or equivalent emission standards, making this truck compliant with increasingly stringent environmental regulations.

Tire Management and Ground Pressure

Because of its immense weight (about 230 tons empty), the T 282 B requires specialized tires. The **Mining Truck T 282 B Liebherr 21382** typically runs on 56/80R63 or 59/80R63 tires, which are among the largest in the world. These tires are designed to distribute the load and reduce ground pressure, minimizing damage to haul roads. Modern tire pressure monitoring systems (TPMS) are integrated, alerting operators to slow leaks or overheating, thus extending tire life and preventing costly blowouts.

Safety Innovations in the T 282 B

Safety is paramount in mining operations, and the **Mining Truck T 282 B Liebherr 21382** incorporates numerous features to protect operators and surrounding personnel.

Operator Cab and Ergonomics

The cab is designed around the operator's comfort and situational awareness. It offers:

- ROPS/FOPS certified: Rollover protective structure and falling object protective structure.
- Climate control: Air conditioning and pressurization to keep out dust.
- Ergonomic controls: Joystick steering, adjustable seats, and a large multi-function display that shows speed, load, and diagnostics.
- Panoramic visibility: Large windows and adjustable mirrors reduce blind spots.

Braking and Retarding Systems

The braking system combines multiple technologies:

1. Service brakes: Oil-cooled, multi-disc brakes on all wheels for controlled stopping.
2. Secondary brakes: Spring-applied, hydraulically released parking brakes that automatically engage if hydraulic pressure is lost.
3. Dynamic retarding: Uses the traction motors to slow the truck, especially useful on downhill hauls. The retarding capacity exceeds 3,000 kW, allowing safe descent even with a full load.
4. Emergency brake: Mechanical and electric backup to bring the truck to a halt in worst-case scenarios.

Collision Avoidance and Camera Systems

Many **Mining Truck T 282 B Liebherr 21382** units are retrofitted or come standard with radar and camera-based collision avoidance systems. These systems detect obstacles, pedestrians, or other vehicles in the

truck's path and alert the operator. Some systems even apply automatic braking if the operator fails to respond. Additionally, surround-view cameras give the operator a 360-degree view on the display, making maneuvering in tight loading zones safer.

Maintenance and Serviceability

Downtime is the enemy of productivity. Liebherr designed the T 282 B for ease of maintenance, and the **Mining Truck T 282 B Liebherr 21382** benefits from that philosophy. Key service points are easily accessible from ground level or via well-placed platforms:

- Centralized lubrication system: Automatically greases bearings and pivot points on a timer, reducing manual labor.
- Modular components: The engine, alternator, and radiators can be removed and replaced relatively quickly.
- Advanced diagnostics: The onboard computer system stores fault codes and performance data. Technicians can connect a laptop to troubleshoot issues without disassembling major components.
- Quick-fill fuel and fluid ports: High-flow couplings for diesel, hydraulic oil, and coolant minimize time spent during daily servicing.

Predictive maintenance using sensors and data analytics is also supported. Operators can monitor tire pressure, oil quality, and vibration patterns to schedule repairs before failures occur.

Technological Innovations and Digital Integration

The **Mining Truck T 282 B Liebherr 21382** is not just a brute-force hauler; it is a smart machine integrated into the digital mine ecosystem.

Autonomous Ready Capabilities

While the T 282 B is primarily operated manually, Liebherr offers an autonomous platform called the Liebherr Autonomous Haulage System (AHS). The truck can be retrofitted with sensors, GPS, and control units to operate without a driver in certain mines. This technology improves safety by removing the operator from risky environments and increases efficiency through consistent cycle times and reduced idle periods.

Fleet Management System Integration

The truck communicates with the mine's dispatch system via high-bandwidth radio or cellular networks. The **Mining Truck T 282 B Liebherr 21382** transmits real-time data on location, load status, fuel level, and maintenance alerts. Fleet managers can optimize routes, assign trucks to shovels, and track productivity from a central control room.

Energy Storage and Hybrid Options

Liebherr has been exploring energy storage systems to capture and reuse braking energy. Some newer T 282 B models incorporate supercapacitors or battery banks that store energy from regenerative braking and release it during acceleration, further reducing fuel consumption and emissions. The specific unit 21382 may or may not include such upgrades, but the platform is designed to accommodate them.

Comparison with Competing Ultra-Class Trucks

The mining truck market is dominated by a few key players: Caterpillar (793F, 797F), Komatsu (930E, 980E), and Hitachi (EH5000). The **Mining Truck T 282 B Liebherr 21382** competes directly with the Caterpillar 797F and Komatsu 980E. Here are some differentiators:

Parameter	Liebherr T 282 B	Caterpillar 797F	Komatsu 980E
Payload (metric tons)	363	363	363
Engine power (hp)	~3,500	~3,500	~3,500
Drivetrain type	Diesel-electric AC	Mechanical	Diesel-electric AC
Empty weight (tonnes)	~230	~260	~240
Key advantage	Lower fuel consumption, lower tare weight	Mechanical simplicity, high power density	Excellent braking, proven reliability

While the Caterpillar 797F uses a mechanical drivetrain that is familiar to many operators, the Liebherr's diesel-electric system offers better fuel economy and fewer driveline components. The **Mining Truck T 282 B Liebherr 21382**is also lighter empty, meaning more payload per trip, though it requires careful matching with shovel size.

Economic Impact on Mining Operations

Investing in a fleet of ultra-class trucks like the **Mining Truck T 282 B Liebherr 21382** comes with a high upfront cost (often over $5 million per unit). However, the total cost of ownership (TCO) can be lower than older, smaller trucks. The key economic benefits include:

- Higher productivity: Fewer trucks needed to move the same tonnage, reducing operator headcount and fleet complexity.
- Lower fuel cost per ton: Diesel-electric drivetrains achieve best-in-class efficiency.
- Reduced maintenance: With no transmission or torque converter, the main wear items are tires, brakes, and engines.

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