

Hydraulic Excavator RH 400



Operating weight	980 t
Engine output	3.280 kW
Face shovel-capacity, metric	85 t
Working cycles for 240 – 400-sht-Trucks	3 – 5

**Higher Production
More Flexibility
Best Versatility**



TEREX  **MINING**

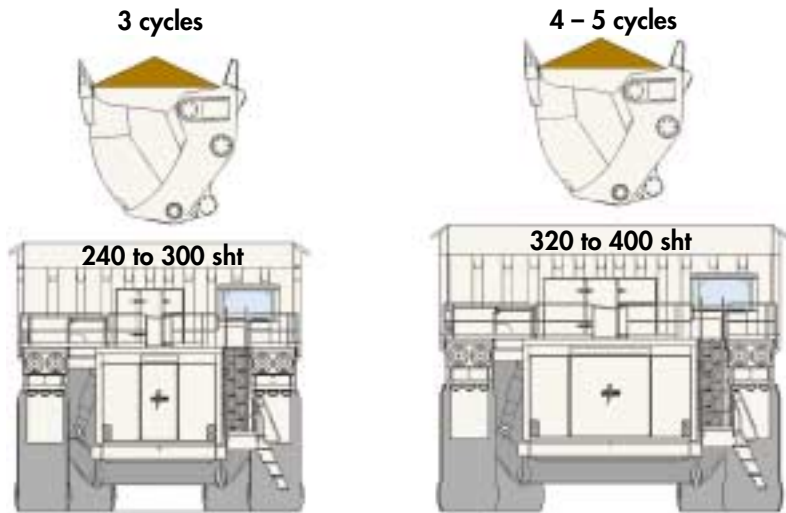


Far more productive than any other hydraulic excavator

The RH 400 is by far the largest hydraulic excavator in the market and represents the flagship of the Terex/O&K product line. Based on proven technology and, with field experience of the world's leading manufacturer of hydraulic excavators above 100 t operating weight, Terex/O&K has built the only hydraulic shovel in the 1000-t-class to date. The RH 400 is an efficient and profitable mining alternative for loading large trucks up to 400 sht.

The latest RH 400 generation has been further improved in terms of productivity, reliability and life expectancy. Higher engine output and enhanced hydraulics lead to faster loading cycles. Terex Mining also provides a newly designed undercarriage to match severe and abrasive ground conditions.

The RH 400 can be delivered with both diesel engines or electric motors.



Production

World record

In the Canadian oilsand – one of the toughest mining applications known – the RH 400 has achieved a new production world record for hydraulic shovels: Well over 9,000 t/h during performance testing and more than 5,500 t/h on average. With recorded bucket payloads of up to 100 sht the RH 400 easily fills 240 sht trucks with 3 passes and, up to 400 sht trucks with 4 to 5 passes respectively.

Faster cycle times

The new Cummins engines "QSK 60-C 2-stage" offer a total output of 3,280 kW (4,400 HP), which is an increase of more than 10%. An extended valve block configuration ensures that the increased engine power is completely transferred to the hydraulic output, i.e. more hydraulic oil flow for faster cylinder movements. This results in average cycle times below 30 seconds.



The hydraulic alternative or supplement to large rope shovel operation

Flexibility

Mobility

The RH 400 hydraulic shovel can easily adapt to various production requirements without prior preparation. Fast travel speed and its capability to climb steep ramps allow for easy tramming even over long distances and between various benches when necessary.



Travelling on steep gradients with ease

Compatibility

This machine quickly adapts to the ever changing mining environment. It will be productive and efficient even with varying bench heights and tight working areas. It provides the required flexibility in today's modern mining applications.



Non dependence of auxiliary equipment in unusual predicaments

Self-sufficiency

The diesel version provides the advantage of a totally independent machine. No additional planning regarding the electric power supply network needs to be considered.



Totally independent

O&K TriPower

The RH 400 face shovel is equipped with the unique O&K TriPower attachment incorporating all the well-known advantages compared to every other hydraulic shovel.

Compared to ordinary rope shovel kinematics the O&K TriPower kinematics even offers further benefits:

- individually controlled boom, stick and bucket motion
- capable of penetrating the face at any digging height for fast cycles
- high bucket filling capacity with low face heights
- bucket can follow the geological contours of the layers
- easy separation of interlayers and partings
- separation and handling of oversized rocks



Versatility

Auxiliary jobs

Some of the support work required in mining applications can be fulfilled by the RH 400 if auxiliary equipment is not available:

- levelling and cleaning of the working surface
- building of ramps
- opening of new benches by drop cuts

Digging capability

Not only a pure loading tool, the RH 400 is designed for hard digging applications. The enormous crowd and breakout forces are available in any position and enables the machine to work in the hardest conditions, e.g. interlocked hard rock piles or frozen oil sand.

Field experience converted into engineering for extended life expectancy

Since the delivery of the first unit in 1997 the RH 400 has undergone continuous development. The first two prototypes started with a service weight of approximately 830 t. Subsequent units underwent major improvements and modifications regarding the attachment, superstructure, undercarriage and carbody etc. These modifications were accompanied by a considerable increase to the operating weight which is now near to 1,000 t.

11 key improvements

Clam

- newly designed lip and hinge neck casting
- improved wear shrouds for better wear protection
- improved boss connection



Backwall

- reinforced steel structure for better stress flow
- increased 'bedding' area for main castings



Carbody

- modified track frame connection
- track frame openings redesigned

Based on field experience with the first hydraulic shovels above 800 t service weight and, in close co-operation with one of our major customers, a number of improvements have been implement-

ed. The main objective of these developments is to further enhance the machine reliability and to increase the 'Mean Time Between Failure'.



Boom and stick

- access for internal quality inspection and long term steel structure monitoring
- modified welding procedure and 'after welding' heat treatment for increased lifetime expectancy.



Stick

- thicker plates in tip area
- stronger stoppers
- increased pin diameter between stick and bucket backwall



Track pads

- best possible load support in center
- high horizontal articulation
- greater clearances
- ground contact area automatically adapts to surface conditions



The new undercarriage: a longer lasting design for increased mobility

Steel structure

- all major components are stress relieved after welding to minimize internal stresses

Superstructure

- latest FE-analysis technology provides basis for reinforcement and local redesign to minimize stress riser in high stress areas

Gearboxes

- pump drive gearbox oil circuit is monitored
- swing gearboxes with improved park brake and reinforced planetaries



Engines

- precise communication between engines and boardcomputer ensures maximum power efficiency
- improved fuel pump arrangement for reliable operation on uneven grounds and with low level fuel tanks

Crawler unit

- single path system with decentralized functions
- reduced loads on moving components
- better adaptation to ground conditions
- higher stability during operation
- idlers, bottom and support rollers connected to central lubrication system

A wide range of improvements have been realised with the latest version of the RH 400



The design has been focussed on long life expectancy and a good self-cleaning effect of components. The possible dynamic loads during travelling have been analysed by extensive multi-body-simulations.

Reliable and easy to maintain under severest conditions



View into the body of a 380-sht-truck

This cab ensures a stress-free shift

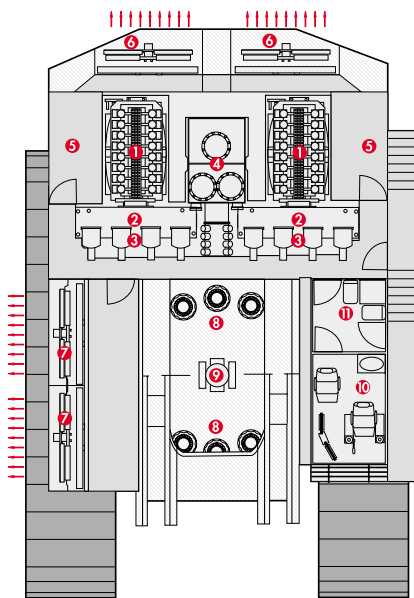
Not only is the cab very spacious, but also ergonomic controls and comfort of the cab can be considered as a pace-setter. A second room behind the cab can be equipped with amenities for the

operator such as a microwave or a refrigerator. The operator's eye level is raised to 9.1 m so that the view into the bodies of ultra large trucks is guaranteed.

Unmatched accessibility

The proven modular design of the superstructure is extremely service friendly. The spacious walk-through machine house allows fast and easy access for all kind of maintenance or service work.

All service fluids can easily be refilled from the ground via the retractable service station under the counterweight.



- 1. Engines
- 2. Pumpdrive gearboxes
- 3. Hydraulic pumps
- 4. Hydraulic oil tank
- 5. Diesel fuel tanks
- 6. Water radiators
- 7. Oil coolers
- 8. Swing drives
- 9. Rotary distributor
- 10. Operator's cab
- 11. Amenity cab
- Service platforms/ walkways



Improvements down to the last details to boost up 'Mean Time Between Failure'

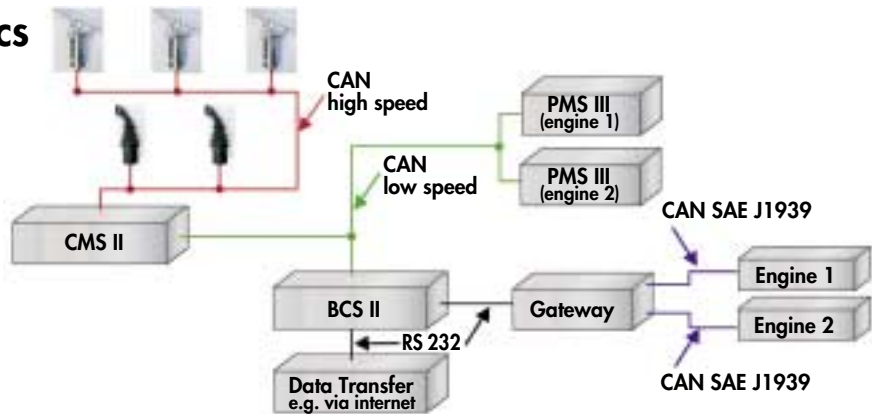
State-of-the-art electronics

Board control saves money

The Board-Control-System BCS is a computer aided monitoring and data logging system. All vital operating and service data are displayed on the new transfective colour screen. As soon as any deviations are detected the operator is alerted visually and acoustically. Trouble-shooting is made much easier and lengthy downtimes are avoided. All data can be downloaded by a laptop or sent to remote addressees by radio modem or internet.

Qualified management for pumps and engines

The further developed Pump Managing System PMS ensures an optimized adaptation between the hydraulic power demand and power output of the engines. Therefore overloading of the engines (or electric motors) is avoided. PMS fine tunes pump flow for optimized performance in order to achieve constant engine speed.



Electronic-hydraulic servo control

The new CMS II ensures a fast and precise reaction from the hydraulic system to any joystick motion. Via the new BCS the joystick characteristics can now be adapted to the individual operator requirements. The machine can be handled more sensitively and comfortably. Also the speed of certain working motions such as clam closing or boom lowering via the floating valve can be limited to avoid stress on structural components.



The BCS Screen is even in direct sun light easy to read due to the new transfective display technology.



Engine mount

The engines are mounted on movable skids. They can easily be moved for better access to the engine front end, coupling or pump gearbox.

Fine-tuned engine cooling

The radiator fan speed is controlled directly by the engine electronics. Therefore the cooling system is continuously adjusted to meet the demand of the engines in order to keep the temperature constant.



Undercarriage lubrication system

The undercarriage components are connected to the automatic central lubrication system. Idlers, bottom and support rollers are lubricated by a separate grease system when the travel function is activated. Therefore life expectancy of the rollers is clearly extended.

Better monitoring

Additional sensors help to prevent misuse of the machine and to detect faults at a very early stage. For example: An ultrasonic sensor fitted to the stick ensures that the bucket backwall cannot hit the track pads.

A flow control sensor measures the flow within the whole gear oil cooling circuit in order to detect any leakages in the cooler, supply lines or gear housing.

RH 400: The first ultra large hydraulic mining shovel



RH 400-1: in oil sand at Syncrude Canada



RH 400-2: the 2nd unit at Syncrude's North Mine



RH 400-3: at Aurora Mine, Syncrude



RH 400-4: Syncrude's 4th machine



RH 400-5: the first machine with electric drive in a coal mine, USA



RH 400-6: North American Construction Group in oil sand at Albian Sands, Canada



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