

Drive & Control profile

200 tons of sheer strength



Heavy chain bands give the caterpillar transporter grip and a broad support surface.

An initial foray into the animal kingdom provokes the question: Which animal is the strongest? The lion? The grizzly bear? Or is it that giant among animals, the elephant? No, the nondescript ant is the real winner when it comes to strength and stamina: ants carry and push material many times their own weight over long distances through fields and woods. Their carrying capability is said to correspond to that of a grown man able to lift an object weighing more than three tons. Ants are real muscle men—it is not for nothing

that a number of lifting truck and fork lift truck manufacturers name their products after the minute six-legged creatures.

In order to be able to transport something particularly heavy from A to B, we humans have developed technical aids. Among the very strongest of these machines is the TC2000 caterpillar transporter from the Polish manufacturer of special machines, Fugo S.A. The transporter has a gigantic creeper band made from metal slats on the right and

Challenge:

Use Rexroth Mobile Hydraulics to help create exceptionally powerful caterpillar mining machine transporter

Bosch Rexroth Solution:

- Four A6VM500 motors with 2-position switching arrangement
- Two A4VG250 pumps
- Two compact open circuit A11VO75 pumps
- Lifting cylinders
- MC6-Controller

Benefits:

- Transporter able to lift and move conveyor stations weighing up to 550 tons
- System provides high tractive power on inclines and enables rapid travel under transport load on level ground
- Special pressure sensors on cylinders maintain load center of gravity automatically
- Single-source supply of multiple hydraulic components aids in machine maintenance and management

left hand sides. An extremely wide support surface not only provides stability, but at the same time ensures that the amazing motive forces are transmitted to the frequently rough surface below. The operator cabin is located between the two creeper bands, and its upper edge is flush with the bands. This means that the TC2000 looks as though its upper surface is almost level. A major part of this surface is taken up by the lifting mechanism, which consists of a vertical movable platform. The transporter can, therefore, move under the item to be transported and lift it prior to moving off.

The TC2000 is used mainly in coal mining where it performs a particular task: when the conveyor belt systems, often several kilometers in length, are to be relocated, logically the stations in which the heavy drive units and belt



(Top) These special machines from Fugo “shoulder” the 500-ton drive stations for the conveyor belt installations.

(Bottom) More than pure strength: Gigantic machines and systems in coal mining applications.

tensioners are located also have to be moved. Of course, one possibility would be to dismantle these stations completely and re-erect them at the new site. However, it is easier, quicker and, above all, more cost-effective with the TC2000: with an intrinsic weight of around 200 tons it is able to ‘shoulder’ and move appreciably heavier stations comparatively effortlessly. But even this level of strength was not sufficient to meet the requirements of the Indian strip-mining company Neyveli Lignite Corporation Ltd.—the TC2000 had to be modified.

More than pure strength

Neyveli Lignite Corporation Ltd., one of the major coal mining companies in India, was looking for a transporter which could be employed to move stations weighing up to 550 tons. These stations housed the four massive drive motors for the conveyor belt installation, each with a 1,250 kilowatt output. In addition, the solution would need to withstand extremely difficult external conditions: for instance, strong winds were a feature of the location where the transporters were to be deployed and this would make the safe transport of weighty goods of this kind more difficult. Also, tropical weather conditions prevail in Neyveli. Temperature fluctuations and the humid climate encourage the development of hazardous condensation water, a real challenge, especially for the electrical systems and the control technology.

Fugo S.A., a company specializing in the production of heavy special machines, was awarded the contract to design this extraordinary machine in co-operation with the Polish company Poltegor Projekt and the



This is how the platform of the caterpillar transporter is raised, lowered and rotated.

Indian company Macnally Bharat Engineering. Rexroth devised a special hydraulic system for this machine, including all components, and delivered the modules for supplying the drive unit. Jaroslaw Wasikowski, Manager of the Rexroth branch in Posen, Poland, outlines the scope of delivery: “We supplied motors, pumps and hydraulic cylinders for this project. The TC2000 is powered by a total of four A6VM500 motors, two for each creeper chain. The fact that these motors are fitted with a robust 2-position switching arrangement makes not only for high tractive power on inclines but also enables rapid travel under transport load on level ground. These motors are supplied by two A4VG250 pumps with a sensitive proportional control. All other functions from lifting using the clamping facility right through to rotating the platform are made possible hydraulically by means of two compact open circuit A11VO75 pumps. These are attached, so as to save on space and cost, to the strong throughput shaft of the A4VG250 travel pumps. For this, Rexroth supplied four lifting cylinders with a diameter of 350/300 x 800 millimeters and fitted special pressure sensors to them.” These serve to identify the center of gravity of the station



(Left) Extraction area worked by the Lignite Corporation in Neyvel in India. (Right) Huge bucket wheel excavators like these produce a tremendous quantity of excavated material, which is transported away on conveyor belts.

during transport. Should this center of gravity stray too far from the mid-point of the transporter, then its movement is automatically arrested.

Control of all functions is by means of a PLC. The drive is realized by means of a Rexroth MC6-Controller. The transporter operator works with two joysticks with which the entire station can be lifted and the transporter drive regulated. “The LCD screen also helps the driver of the machine can use this to check out all the important working parameters and to monitor the overall system,” explains Wasikowski. In addition, all the basic functions can also be operated by remote control.

From a single source

An important innovation with this transporter is its hybrid drive system. Just like the most up-to-date cars, the transporter also has two alternative solutions at its disposal, namely a diesel and an electric motor. So, when it is called upon to perform shorter marshalling movements in the vicinity of the station to be moved, the TC2000 can change from diesel to electric drive, thus achieving a distinct reduction in operating costs. Initial assembly and commissioning took place at Fugo in Poland. Following a successful test run the caterpillar transporter was completely dismantled and shipped

to India where it was assembled and proceeded to final commissioning. “The benefit that we gained from the realization of this project was that we were able to offer the customer a number of components from the different sectors of Mobile Hydraulics from a single source”, explained Wasikowski, “because system capability is playing an increasing role in modern control and drive technology.” Thus Rexroth was able to win the customer round by systematically linking specially co-ordinated hydraulic pumps, motors and the latest cylinder solutions.

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