

## Drop Ball / Grapple Can one machine do both ?



Drop ball is one of the simplest yet most destructive operations you can put a crane into. Every cycle is a shock load. Making matters worse, people generally use machines which are undersized for the work and in reality are two rope, friction machines built for lift crane service.

Drop ball is not a continuous operation but may occupy 10 days per month. It would be great to have a machine that could withstand drop ball and convert within a few minutes to grapple.

PLM cranes of the Netherlands has introduced such a machine in three size ranges ranging from the PLM 65, similar in size to a Bucyrus Erie 88B, the PLM 80, similar in size to a Manitowoc 4100, and the PLM 2020 which is a bit bigger than a Manitowoc 4600.

The PLMs are built as a true duty cycle crane for clamshell, dredging, scrap handling and many other applications. PLMs are the only true duty cycle hydraulic crane built in the world to-day.

### Crane Details

PLMs are extremely heavy cranes built exclusively for duty cycle work. PLMs use three drums with two wire ropes from each drum. One drum is holding, one is closing and the third is for the boom.

One rope is right lay, the other is left lay with two wires for holding and two wires for closing. Using this system, the clam is able to be lowered to more than 100ft below the base of the crane without spinning and without any tagline. With this arrangement, all four wires haul up simultaneously to give enormous line pull.

The line pull on a PLM 80 and on the 2020 for example is 66,000 lbs ! No multiple reeving is necessary and your ropes are all on one layer on the drum. This is a dream come true for magnet work.

PLM cranes use only one layer on the drum for holding the wire ropes, including the boom hoist. This ensures that wire ropes will last for more than 1000 hours of use. The drums are driven hydraulically using Mannesman Rexroth pumps and motors. Final drives are Lohman.

PLM cranes have the following features:

1. High power using Cat or Cummins diesel engine.
2. 5000 psi hydraulic system running at 2500 psi.
3. High capacity hydraulic cooler, 50% of the engine horsepower.
4. No frictions, no brakes...crane drives like an excavator.
5. Oil filtering on pressure and low pressure side.
6. Closed loop hydraulics, one pump for each function of the crane.
7. Well oversized slew bearing with large rolling elements.
8. Automatic lubrication systems.
9. Self-contained to retain any spilled fluids inside the machinery house.
10. Cast steel sheaves with aluminium bronze bushings.
11. All wire ropes contained on one layer on the drums.
12. Enhanced cab with heating, A/C and CD player.
13. 260 fpm hauling up speed under full load.
14. 350 fpm lowering speed.
15. Cat undercarriage.

Of primary importance is the ease of operation. With only two joysticks and no brakes or pedals to worry about, a totally inexperienced person can become very proficient in a short period of time. If you can drive an excavator, you can drive this crane.

Full specifications and details about the cranes are available on request.

### Controls and Magnet Features

The PLM is equipped with a 40kw electric generating plant running off the diesel engine. This is used to power the magnet, no separate engine is required. A selector switch is provided in the driver's cab to select grapple mode or magnet mode.

In magnet mode, a lifting block is provided that attaches to the two closing lines and the two holding lines to provide 4 wire ropes coming down to the magnet.



The holding and closing drum are locked together through the PLC controller so that when the operator hauls up, both drums come together and similarly go down together. The crane is able to operate in this mode continuously without losing synchronizing of the drums.

The PLC controller senses if the drums are becoming unsynchronized via the drum rotation counters and makes appropriate adjustments that are not detectable by the crane operator.

Acceleration and deceleration of the load is controlled through the PLC so that when the operator pulls back on the joystick, the load is picked up and accelerated smoothly up to speed.

When the magnet reaches the proper height, drum rotation counters stop the winches. The operator then depresses a thumb switch to drop the ball.

The thumb switch is disabled until the magnet reaches the pre-set dropping height.

The PLM crane is able to work continuously in this service without damaging the structure, slew bearing and mechanical components and without

overheating, even if the temperature outside is above 100 degrees.

The boom is very heavily constructed with heavy chords and lattice members and large section. This is very important in drop ball as the member stresses are low. This greatly reduces the effect of shock loading.

The slew bearing on the 80 and the 2020 is a triple roller element design which is also used on the PLM3520. This bearing is grossly oversized for the smaller machines and they are able to withstand several million cycles.

PLMs are provided with automatic greasing for every point on the crane including the sheaves and slew bearing.

In drop ball application, the PLM will run with normal maintenance for 40,000 hours. At 40,000 hours, the pumps and drives will need to be overhauled. The crane is then good for another 40,000 hours. The overhauling cost is about \$200,000.00.

After 10 years in this service, the PLM will have a re-sale value of 80% or better of the original purchase value.

### Grapple Mode

To switch to grapple, the mode selector switch is switched from magnet to grapple. This disengages the electric generator and frees the drums for independent operation.

The lifting block is unhooked and the grapple is connected, two ropes from the holding winch and two ropes from the closing winch. Nemag quick disconnects are used to allow immediate connection / disconnect of the wire ropes.



In grapple mode, the operation is somewhat automated. To open the grapple, the driver shifts the right joystick to the right. The closing winch pays out enough line to open the grapple and then automatically stops.

The grapple is then lowered by moving the joystick to the top right corner. The grapple then hoists down open until it comes to rest on the material to be grabbed. Sensors in the holding and closing winch circuits sense when the grapple has landed and automatically stop both winches to prevent the operator from paying out too much line.

To close the grapple, the operator brings the joystick back to the left back corner. The holding winch automatically hauls in until the drum rotation counters sense that the grapple is closed.

The holding and closing winches then haul together, 40% on the holding and 60% on the closing. Two-blocking is prevented drum rotation counters.

### Undercarriage

In duty cycle work, the longevity of the undercarriage is of paramount concern.

PLM builds a massive centre frame to which heavy side frames are bolted. The crawlers are not retractable and the configuration is extremely tough.



Side track components are Cat. For the 80, the undercarriage is Cat B7 design and for the 2020, B8. This means that you are getting the heaviest components for the class of machine.

Track drives are Lohman and the motors are Mannesman Rexroth. These are the best components money can buy.

Crawler chain and track rollers are Cat exclusively on every PLM.

Some Owners go really crazy and will put the PLM 80 on a 2020 undercarriage. This is overkill but it does not cost that much.

### Summary

The PLM combination drop ball, scrap handler is a perfect solution for steel mills. The machine can be kept busy continuously in either service and can take the place of three or four machines.

With a life expectancy of 40,000 hours before rebuild, the PLM outlasts alternative machines by 8 times. After 40,000 hours, the PLM is re-fit with new pumps, motors and drives and is then ready as new.

Because there is no multiple reeving and all wire rope is on a single layer on the drum, wire ropes will last a long time. Generally the hoisting wires last six to eight months in continuous service and the boom hoist wire lasts a year.

The money that can be saved by replacing several machines with one along with saving the maintenance cost usually incurred with traditional drop ball machines will pay for a PLM 80 within 3 years. After 10 years of service, your PLM will have a value very close to what you paid for it when it was new.

You cannot find a tougher, more versatile and easy to operate machine than a PLM.

Service depots are located in North America in Pennsylvania and Illinois. All parts for a complete machine are stocked in the Netherlands and most parts are available off the shelf in North America. Most parts are stocked at the PLM service depots in North America.

PLM are fully dedicated to building the toughest, highest powered, lowest maintenance, easiest to operate machines in the world with the best components money can buy. You cannot buy better.