27T Chute Change Out Scissor Lift

Manufacture Date	September 2016
Rated Capacity	27 tonne
Height Raised	5.6 m
Length	6.05 m
Width	2.44 m
Tare mass	16.3 tonne
Travel Speed Lowered - high/low	60 m/min ~2.5 m/min
Travel Speed Raised - high/low	2.5 m/min ~0.45 m/min
Typical time to raise/lower	340 sec/140 sec
Horizontal shift of top platform	± 250mm
Angular rotation (yaw) of top platform	± 1°
Angular rotation (roll) of top platform	± 2°
Angular rotation (pitch) of top platform	± 1°
Braking System	Disk brake on axle, spring applied, pressure release
Engine	Hatz Diesel 3 cylinder 39.8kW @ 2500 rpm

Introduction

Train load outs on the iron ore mines in Western Australia are equipped with chutes that have to be removed from time to time for general maintenance and so that the wear package can be replaced. The chute consists of two sections: the top is fixed and vertical, and the lower portion, known as the swing chute, is on a pivot and can rotate from the vertical to horizontal. Removing and dropping the chute has, in the past, been a labour intensive manual process using equipment such as chain blocks and 'come-alongs'.

Designed by CMP Engineers, Loadquip has supplied the Schenck Process ProLift, which is a self propelled, rail mounted, scissor lift. The device engages with the chute, provides support while it is un-bolted, lowers it to ground level and then moves it out of the train load out point, for loading onto a truck. A replacement chute can then be loaded onto the ProLift, transported on the rails, raised and bolted into position. The ProLift lifts a new chute in about 10 minutes, compared to roughly 4 hours using chain blocks.

The ProLift and the integrated chute transport frame have been designed by CMP Engineers, and supplied by Loadquip Pty Ltd.

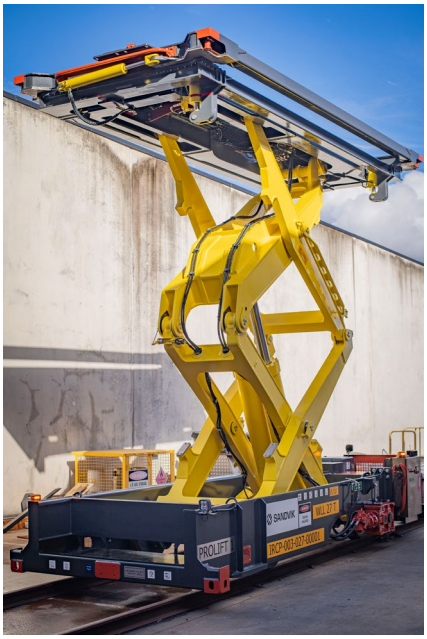
General Description

The ProLift is a unique machine for the removal and installation of train load out chutes on iron ore mines. It has standard 20' container base dimensions so that it can be transported to sites using a side loading container trailer. It is used in combination with a customised frame, also based on standard container dimensions, that engages with the chute. Apart from the raise/lower and propel functions the upper support platform position is adjustable (left/right shift, yaw, roll and pitch rotation) so that the chute flange can be precisely aligned with the bolt pattern in the train load out structure.

The machine is powered by a diesel engine, with all motions: raise, lower, propel and platform adjustment being hydraulically controlled. The primary means of operation of the machine is via a remote control unit with the controls having two speeds for all motions: creep and normal. In the raised position the control system only allows creep speed.

Loadquip has designed (via CMP Engineers), implemented and installed the complete control system and graphical user interface (GUI) for the ProLift. It is controlled by a PLC and operated using a custom designed fourteen button wireless remote control unit communicating to the PLC via the CAN Open communication protocol.

The PLC program provides extensive diagnostic reporting and system integrity checking. It also controls the selection of speed, position and pressure limits, so that when the ProLift is at specific raised heights, the pressure in the hydraulic circuit is limited to avoid excessive upward force on the chute structure.



Safety

The ProLift has delivered a significant improvement in the safety of the chute change-out procedure by eliminating most of the manual handling.

The safety features intrinsic to the machine include sensors to detect the height of the top platform, so that the travel speed is limited depending on the position.

Sensors also detect the state of numerous other functions so that it isn't possible to operate the machine in an unsafe mode. For maintenance work there are rigid props which lock the arms and prevent the scissor lowering.

The remote control unit allows the operator to control the ProLift from a safe location. Emergency Stop buttons are provided at the front and rear as well as on the wireless remote control and auxiliary control pendant. Audible signals and warning beacons alert the operator of any machine movement.