



BMU Plus

Tractel[®] BMUs provide a complete and easy to use system to access to the exterior of a building. Access to the platform is from the roof level and the operation requires less preparation and rigging time. Built-in safety devices efficiently control and monitor all operations to ensure complete operator safety, total access and protection of the facade surfaces.

Advantages of a BMU:

- Optimum solution for any building height
- Integrated with the façade design
- Powered traverse without exiting the platform
- Can be designed to store out of site when not in use
- Higher productivity as workers have less preparation and rigging time
- A variety of control systems to fit your needs
- New extended boom design for smoother movement



BMU's can be fixed stationary if the boom reach allows, if not a track on the roof is required for traversing the rooftop. The track will require a clear path of travel for the BMU free of obstacle's like air conditioning units or water tanks. BMUs are primarily run on a structurally anchored wide flange track near the edge of the building. Other options such as freely laid rail or concrete runways may be considered depending upon the application.

BMU Plus

BMU's are designed to provide safe and reliable access for high-rise buildings over 490 feet tall or for buildings with unique architectural features with difficult to access facades. Work platforms can be designed with live loads that support 2 or 3 workers. It is also possible to add a material hoist to the BMU for glass replacement or other material handling requirements.

The typical BMU features consist of:

- tirak® hoisting package, recognized throughout the world as the most reliable hoist available
- Fixed or traversing lower carriage
- Fixed or telescoping mast with slewing base
- Fixed, telescoping, or luffing boom with cross boom
- Work platform suspended from four independent wire ropes
- Lifting and lowering the platform
- Boom angle (luffing)
- Slewing of the turret and the spreader bar

All the actions are controlled by a choice of wireless conductor core or cable communicators. User friendly design with dedicated switches for each function eliminates unintentional machine movement. LCD display clearly communicates status of the BMU and platform to operator on platform and to the rooftop redundant control panel.



BMU in parked position



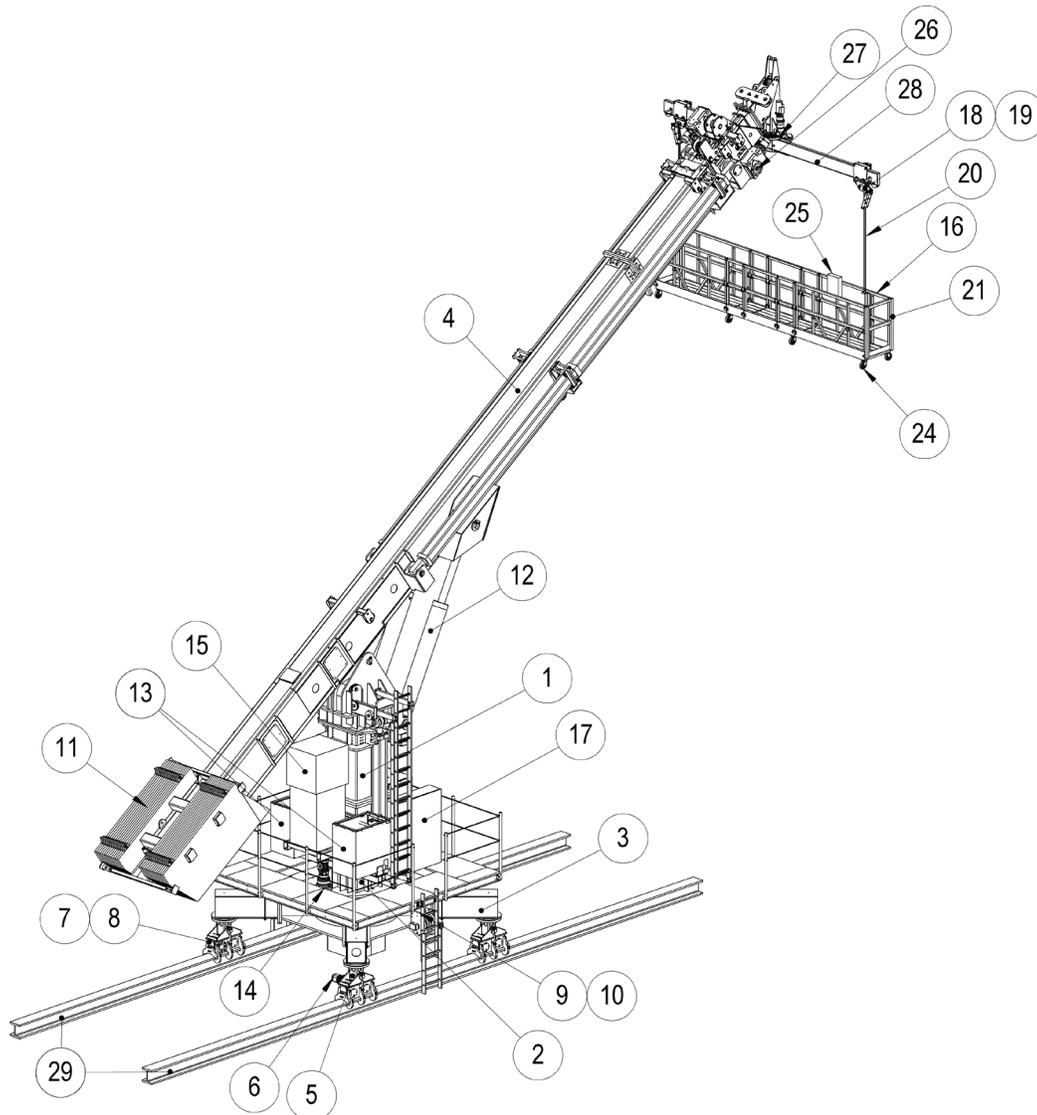
BMU - telescopic mast raised, telescopic boom deployed



BMU - Fixed position with slewing turret, telescopic boom retracted



BMU - With Self-Powered Platform for buildings less than 490 feet



MAIN COMPONENTS OF A BMU

- | | | | |
|-----|---|-----|------------------------------------|
| 1. | Turret | 15. | Hydraulic unit |
| 2. | Powered slewing ring | 16. | Overload limit device |
| 3. | Lower Carriage | 17. | BMU control box |
| 4. | Boom | 18. | Upper limit switch |
| 5. | Drive wheel assembly | 19. | Final upper limit switch |
| 6. | Geared motor with brake | 20. | Suspension wire rope |
| 7. | Rear wheel assembly (not powered) | 21. | Work platform |
| 8. | Guide wheel | 23. | Bumper roller (not shown) |
| 9. | Reel for power supply cable | 24. | Swivel castor |
| 10. | Guide for power supply cable | 25. | Platform control box |
| 11. | Counterweight | 26. | Cross boom rotation (slewing) ring |
| 12. | Hydraulic ram/ connecting bar | 27. | Cross boom motor |
| 13. | tirak® hoist with dual wire rope reeler | 28. | Cross boom arm |
| 14. | Geared slewing motor | 29. | BMU track |

DESCRIPTION OF THE COMPONENTS

Lower carriage

The lower carriage and the turret are connected by a slewing ring which is rotated by an electric motor.

- The lower carriage can be fixed to a central part of the building and is designed to reach all areas requiring access from this fixed point.
- The lower carriage can traverse a rail system via wheel assemblies that are fitted to the frame. The rear wheel assemblies are mounted on an articulated spreader beam to ensure an even load distribution.

Traversing system

Traversing is powered by an electrical motor with a speed approximately 20 ft./min (6 m/min.) In general, only the two wheels are powered.

The lower carriage is guided along the track by guide wheels placed laterally on the wheel assemblies, whether 'L' shaped guide track (Fig. 4), or I-beam track (Fig. 5) is used.

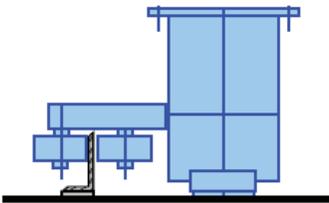


Fig. 4 - Traversing on concrete track, with 'L' shaped guide rail

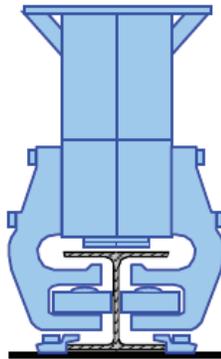


Fig 5 - Traversing on rails

tirak® hoisting mechanism

The lifting mechanism consists of two tirak® hoists with dual reelers, manufactured in Germany by the Tractel® Group and specially designed for Tractel® building maintenance units. The tirak® hoist are fitted with an over-speed safety brake which automatically engages if the platform descends too fast, and a disc brake, which stops the hoist during normal operation.



TIRAK® hoist shown with dual reelers

Other benefits of the tirak® hoist:

- Rotation counter on each tirak® prevents one hoist running without the other
- Rotation counter ensures platform levelness is maintained
- Compact, robust, lightweight and reliable design
- Dual reelers passively collect the wire rope exiting the hoist. Because the ropes are not stored under tension damage and broken strands are eliminated prolonging the life span of the wire rope
- Low maintenance: minimal number of parts
- Integrated safety features: overload detection, centrifugal brake, electromagnetic motor brake and in the event of loss of power, a manual descent device.
- Speed and lifting force remain constant during operation
- Automatic correction for any wire rope stretching
- Longevity of conductor core wire rope

Hydraulic system

A primary and redundant powered hydraulic ram are used to operate the luffing of the boom if equipped.

Boom luffing

The boom can be articulated on an axle with a positive or negative angle of inclination. A crossbar fixed to the boom takes the head of the hydraulic ram for operating the boom.

Cross-boom

The cross-boom is fixed at the head of the boom. The cross-boom is fully adjustable to orientate the platform to suit any drop location.

Telescopic mast

A telescopic mast can be incorporated to allow the equipment to reach over tall parapet or screen walls and for discrete parking of the equipment.

Electrical system

The electrical system consists of the following main items:

- On the building
 - the main switch, located on the roof
 - power supply points, 3-phase and ground, positioned along the track and protected by a circuit-breaker (supplied by the customer)
- On the BMU
 - the power supply cable for connecting the BMU frame to the power points. This cable is stored on a reel fixed to the BMU
 - an electrical panel with a remote control for the unit.
- On the platform
 - control pendant
 - an auxiliary control panel

Platform

All suspended platforms are dual line suspended. The platforms are driven by tirak® hoists on the BMU unit, instead of on the platform. These work platforms are constructed of tubular aluminum clad in perforated aluminum panels. Typical length is from 10 ft. (3 m) to 40 ft. if required. Typical capacity is for 2 or 3 workers.

Typical Controls

The BMU is controlled via two fail safe remote control units located on the platform and roof level on the BMU. Communication between the BMU and platform uses a Controller Area Network (CAN bus) communication protocol. This is a very robust, stable and safe technology originally developed for the automotive industry. The control system is equipped with fail-safe toggle switches and a LCD display for communicating current status of the BMU and platform to the operator. The same control panel is used on the platform and the BMU making it easy for the operators to control the machine from either location. Operators are well informed of BMU and platform status, by text messages displayed on a LCD screen. No need to look up codes in a manual in order to decipher messages. The customer can choose from three-means of communication wireless, conductor core or cable.

Integrated safety

To ensure safe operation and user safety, the machine is fitted with a number of safety devices which monitor the correct operation of the various components and operate in the event of a breakdown or fault.

- The control system senses the stage tilt angle and automatically compensates to keep the stage level during ascent and descent
- Stage and material hoist static feature. The stage and material remains static during boom and or mast movement
- Operate without interruption, even in areas with many radio users
- Fully automatic frequency management integrated into the radio system

Stage power supply

If serial wire communication is the means for communication, the power is supplied via the conductors of the communication cable, either by external cable or conductor cables of the wire rope. If wireless communication is the means for communication, the power is supplied via a 10 hr. lithium ion battery. The system comes with two batteries which can be easily swapped in the event that the one powering the unit becomes depleted.



Fault management

Both BMU and platform remote control units are equipped with a LCD display and fault indicator LEDs. Fault messages are displayed in plain English on the LCD display. In addition the LED light indicators provide a complete view of the state of the machine relative to the function which is being initiated.

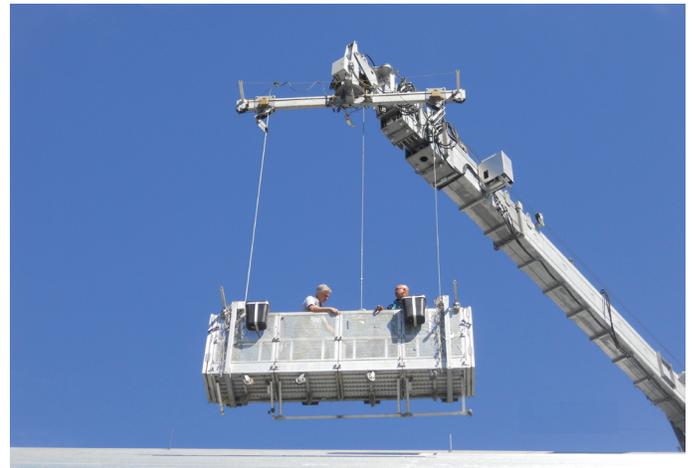
Safety devices

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1. Safety devices on the platform
 - emergency stop
 - lower obstruction bar
 - overload safety device
 - anti-tilt safety device
 - ISA limit sensor
- 1.1 Optional safety devices on the platform
 - upper obstruction bar
 - ISA limit sensor
(not required with mullion guides)
- 2 Safety devices on the BMU
 - emergency stop
 - platform final upper limit switch
 - slack wire rope safety device
 - end of wire rope safety device
 - over-speed protection
 - emergency lowering handle
 - end of track sensor
 - manual decent in the event of a power outage
 - anemometer (wind speed indicator)
 - tirak® out of synch sensors - redundant and independent stage tilt detection system, prevents the stage from reaching an out of tilt state
- 2.1 Optional safety devices on the BMU
 - boom anti-collision device

Fault management

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Optional features:

- Material hoist/glass handling winch
- Transferable stabilization system
- Suspension point trolley system under the cross boom
- Under 490' can have a self powered platform versus roof mounted hoists