

# CUSTOM MINING SOLUTIONS

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## VOID MONITOR .

OVERVIEW . PRODUCT . FEATURES . FUNCTIONABILITY .

DIRECTOR  
JAKE HARTWIG

# VOID MONITOR . INSTALLING ONE TODAY COULD SAVE A LIFE TOMMOROW

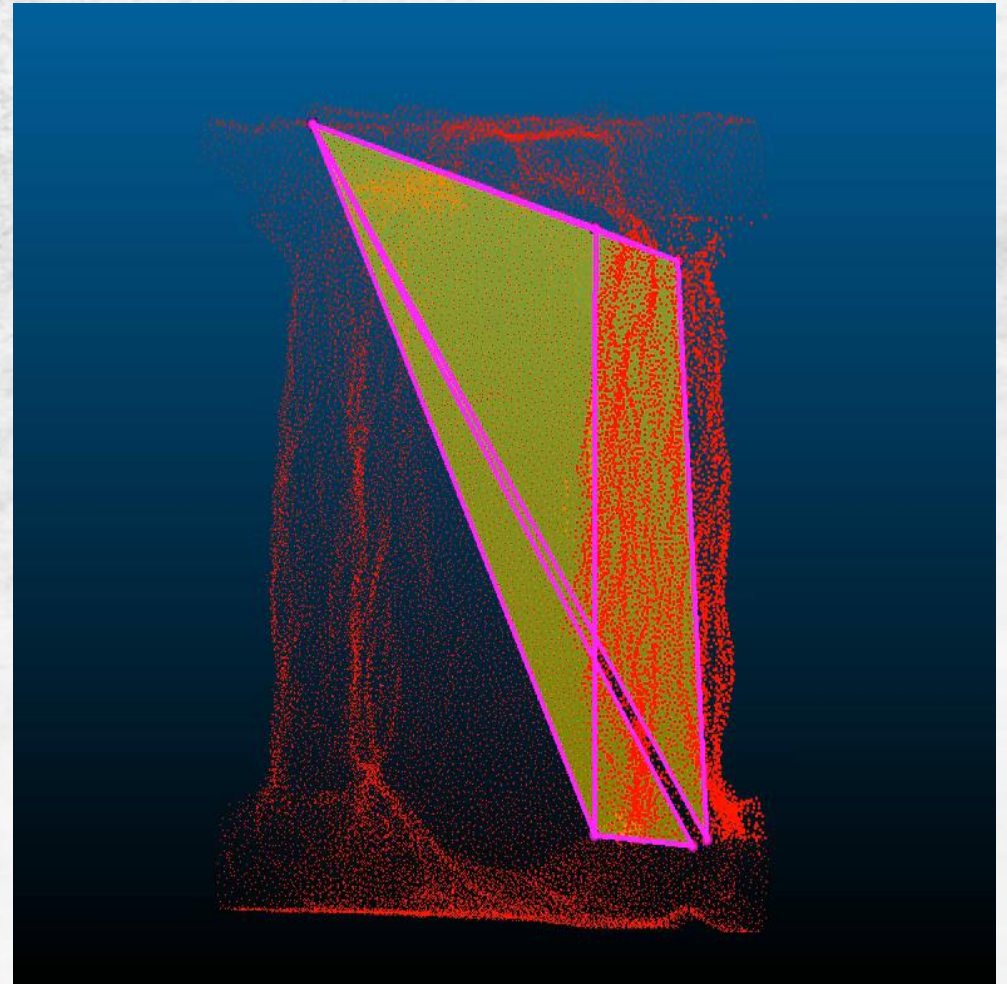
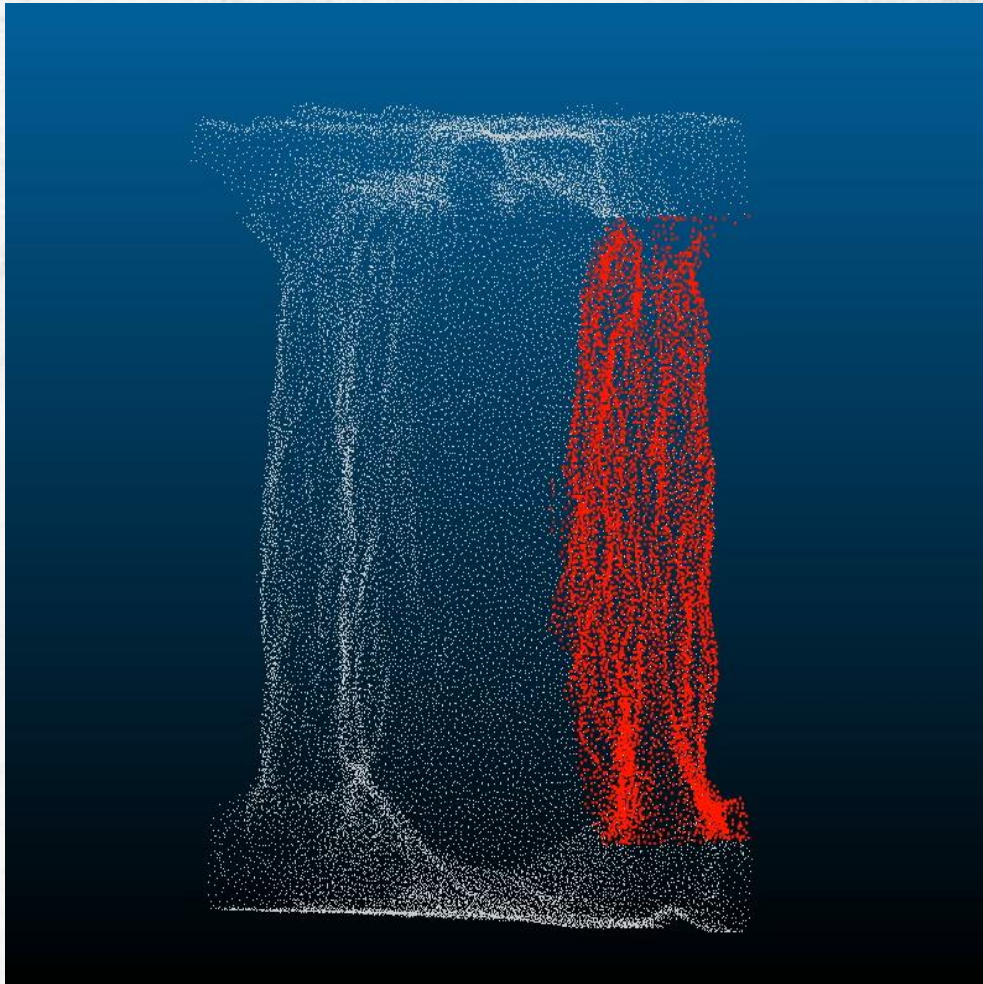
SUPPORTED  
BY



**HILMGROVE**  
**RESOURCES**



The Void Monitor is already equipped with the necessary capabilities and can be easily adapted for broader stope applications with minor adjustments.



# VOID MONITOR .

## INTRODUCTION

Using the latest innovative surveying technology Custom Mining Solutions is now manufacturing a new Void Monitoring safety device to help keep personnel and assets out of harms way.

Traditional methods of monitoring the status of an unbolted face at a tip point can easily be subject to human error. Due to the fact that operators may not observe the bucket indicators on their way in, or simply not get out of the machine to inspect the dip holes before tipping their first load for the shift.

These methods are also time sensitive and need human observation to ensure the condition status of the face. Dip holes and bucket indicators are checked once a shift, this means during a 12 hour shift, the status of the unbolted face where personnel and machines sit above, can go unmonitored for more than 11 hours each shift.

Bucket indicators are not directly below the tip point, dip holes can only be viewed from 1 side and drone scans are time sensitive also, as they are only carried out once a week. All 3 of these leave room for error. We should be embracing new technologies to increase safety throughout mining worldwide.

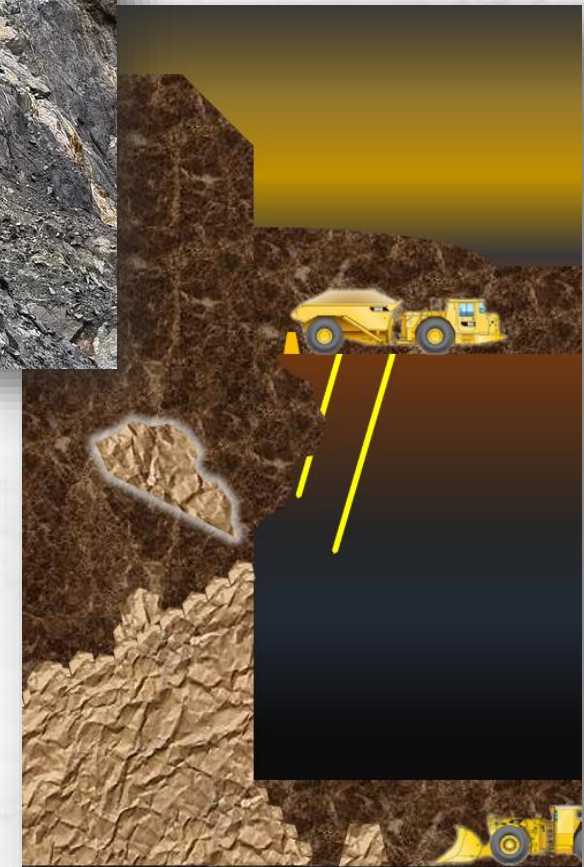
The Void Monitor system is a 24/7 live viewing safety arrangement for monitoring a face at an unloading location, at a vertical void. Custom designs can be made to suit different applications and uses.

The Void monitor is fixed with a 3D LiDAR scanner, which reads the status of the face and reports the information to a traffic light system at a safe distance from the area, reporting if it is safe for a vehicle to be unloading at the edge of the void. When the Void Monitor is in the wound-up position, it is safely tucked to one side so as to be out of the way of tipping machinery. The scanner will continuously be monitoring the status of the face and edge reporting to the indication point.

The LED traffic light system is mounted in plain sight which personnel will see prior to entering the hazardous area.

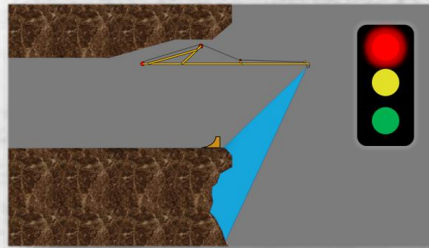
MODBUS communication options are also available for System Integration.

Which will allow the Void Monitor's status to be viewed live from the control tower. Feeding back real time information and alerts on the tip point's condition.



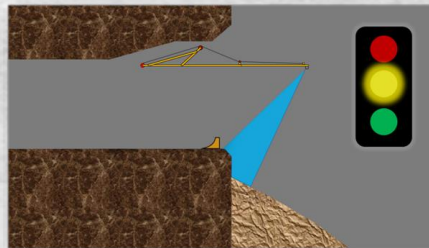
# VOID MONITOR .

## TRAFFIC LIGHT SYSTEM .



The Void Monitors traffic light system is made up of 3 main functions.

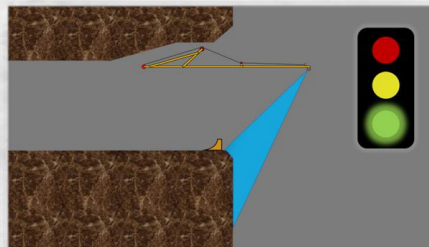
The Green Light represents the area is in the intended state, structurally in tact and is safe to proceed .



The Amber light represents the material has reached a certain level meaning the area has filled up to its capacity. This stops personnel from overfilling the tip points, eliminating damage, spillage, ramping of the tippie and downtime for production due to overfilling.

The Amber light also has a built in function that allows the LiDAR scanner to decipher between a machine's presence and the material itself.

While a machine is present the amber light will intermittently flash, until the truck has left the field of view and then it will change back to a solid green. This can also be an indicator to the next truck approaching to let them know that there is one tipping. If material is present for longer than 60 seconds, the light will illuminate a solid amber indicating its full.



The Red light will illuminate when there is a significant change and something is missing from the field of view. This indicates a fall of ground has occurred, which is structurally therefore the area is not safe to proceed. The operator is to notify the shift boss for further instruction, as the area will need to be scanned and reviewed.

We are currently working on a real time viewer, with a data recording option for incident analysis.



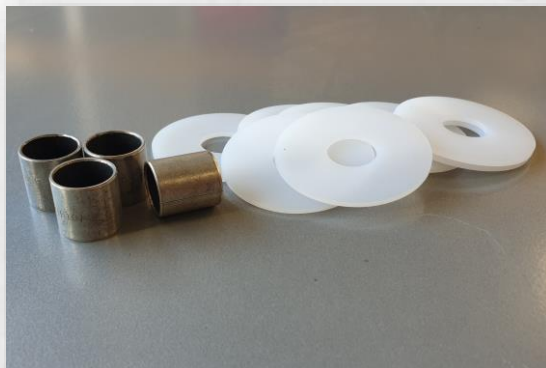
# VOID MONITOR .

## CNC MACHINED PARTS .

Specifically designed solid aluminium 6061-T6 grade CNC machined hinges for strength and durability. All hinges have been designed to slip into the frame for TIG welding.

Self lubricating Teflon coated bushes with nylon washers preventing, corrosion, wear and tear, and coefficient friction between different metals.

Stainless steel recessed M16 bolts with nylon lock nuts, to ensure nothing comes loose.

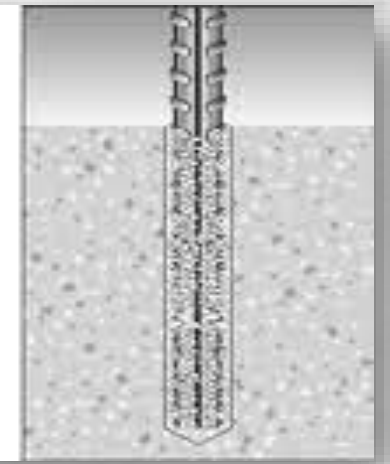
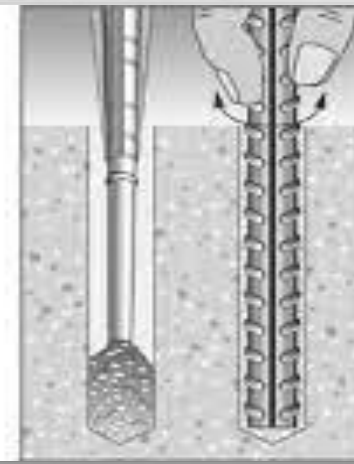
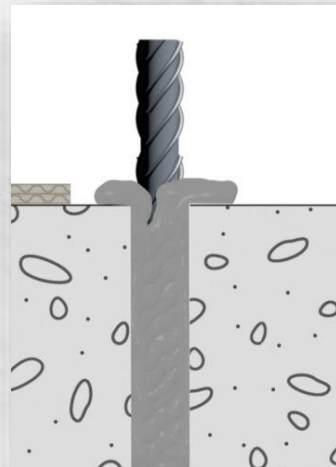
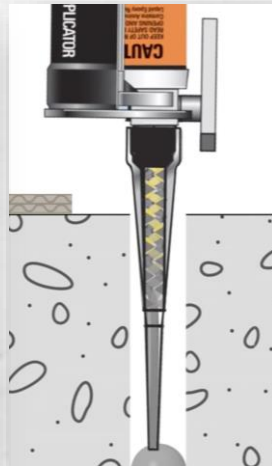
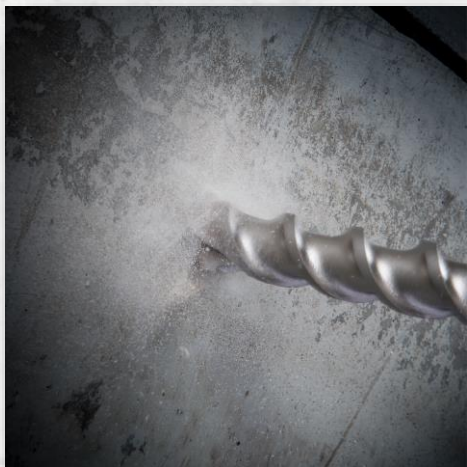
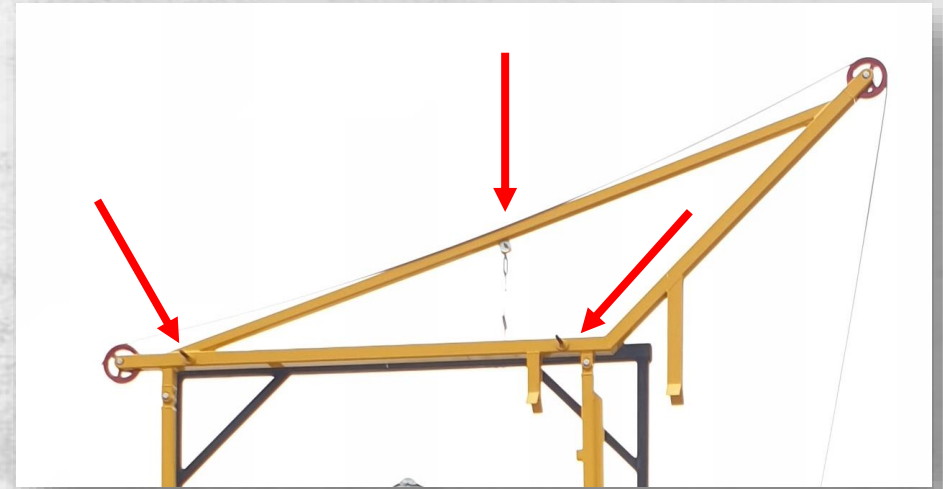


# VOID MONITOR .

## MOUNTING .

All thread is used to mount and level up the head frame before the rest of the components are installed. This ensures that the frame is level both horizontally inline with the void and vertically level.

The Void Monitor will be mounted using, 16mm and 27mm S/S all thread fastened into the rock wall. The all thread's will be glued in using Hilti rock glue, at 3 main points along the head frame.



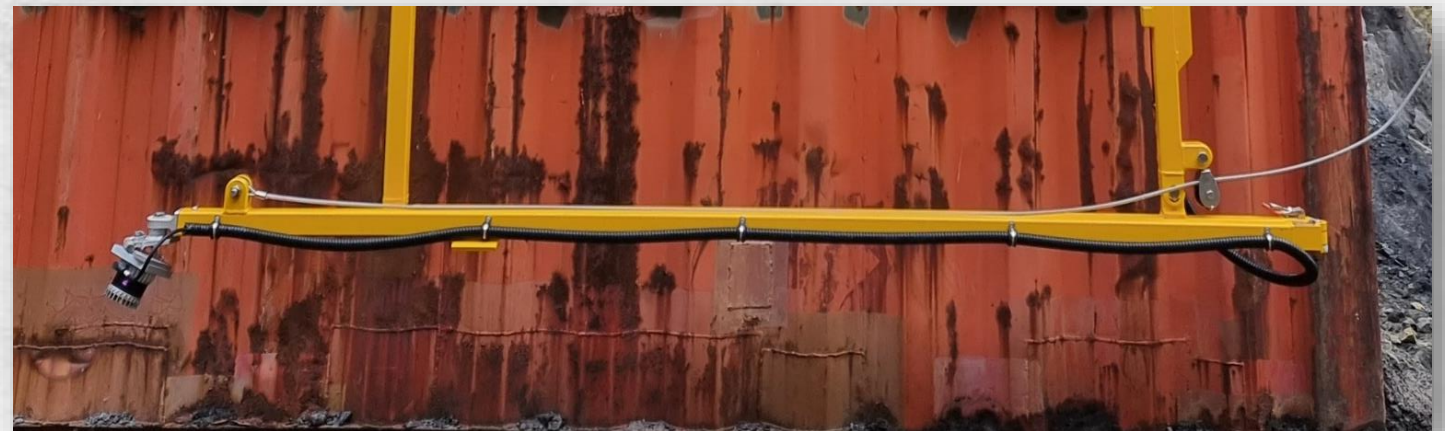
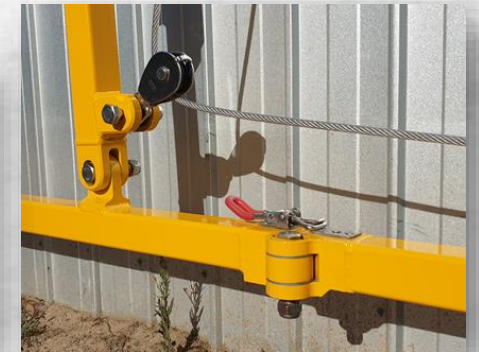
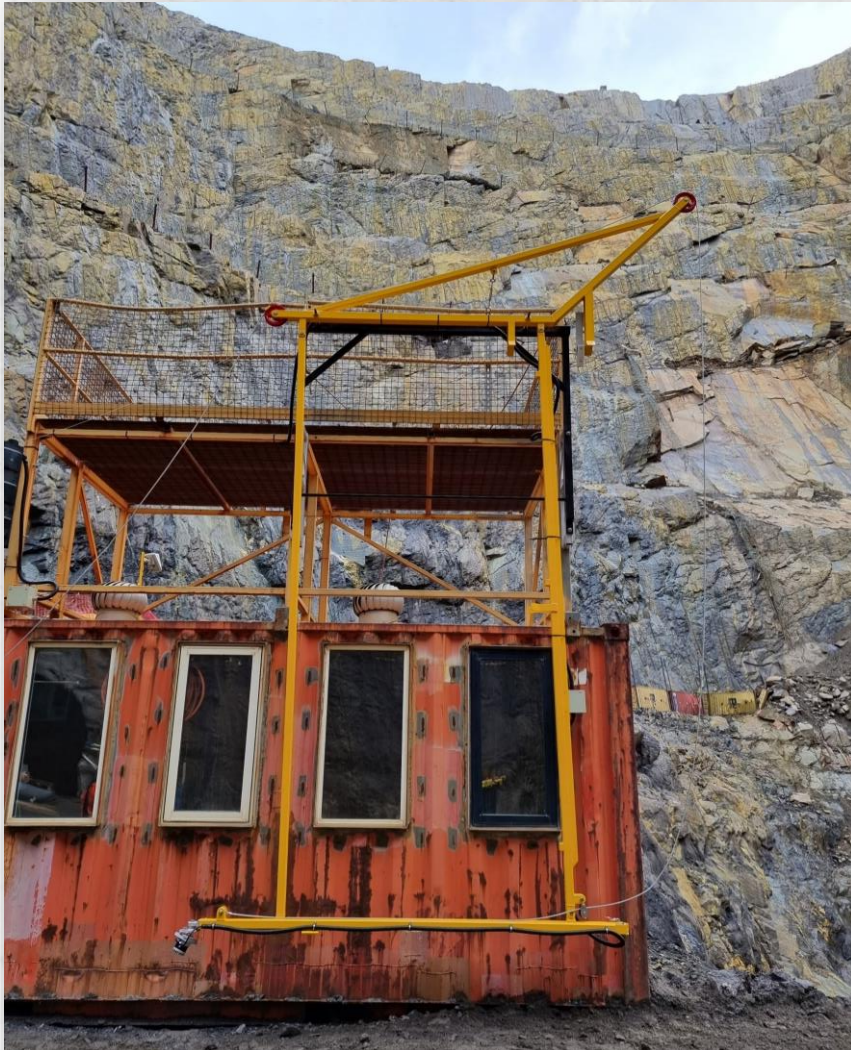


# VOID MONITOR .

FOLD AND RETURN FUNCTION .

A specifically designed heavy duty return hinge with a stainless steel over centre locking latch, has been installed for easy and safe access from behind the 3m exclusion zone.

This allows the operator to unlatch and fold the LiDAR scanner arm around into the safe zone for cleaning, inspection or scheduled maintenance.



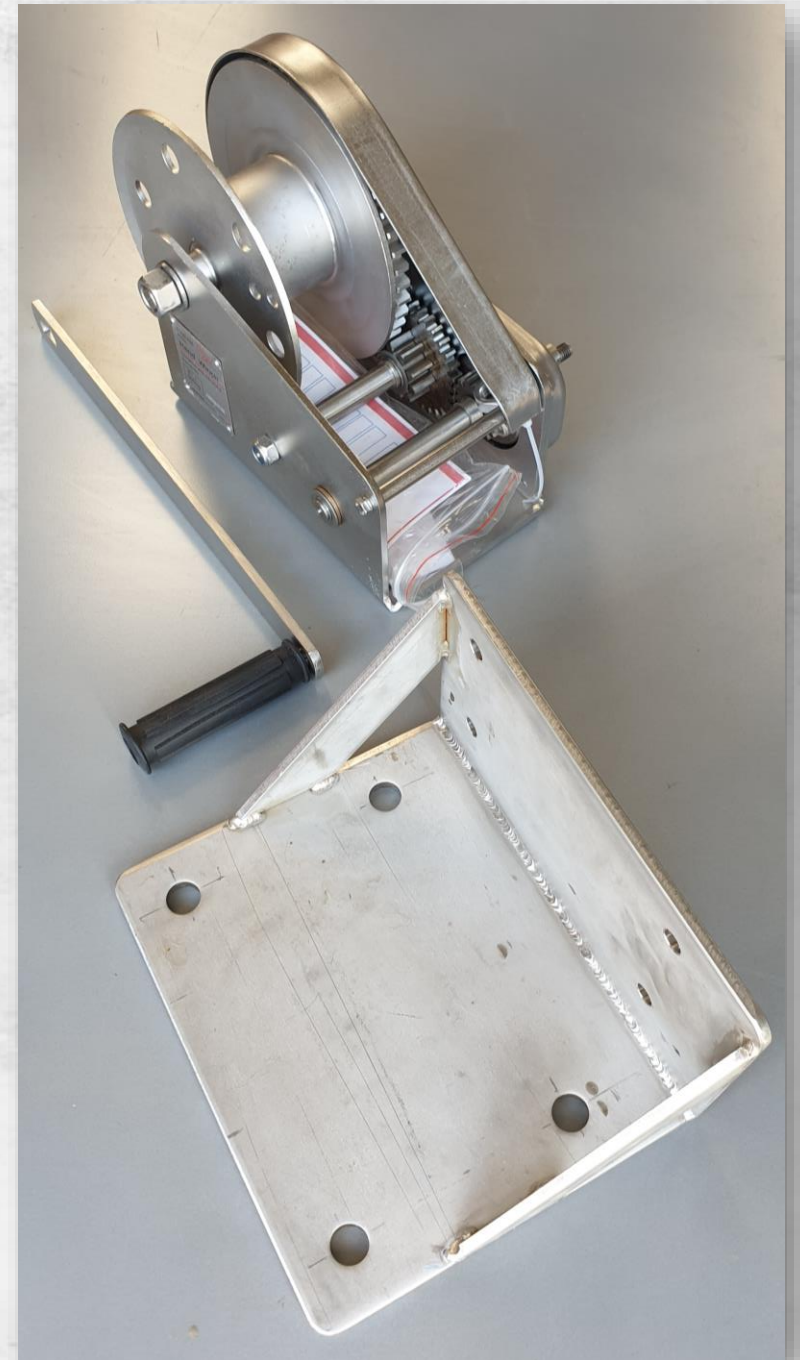
# VOID MONITOR .

WINCH . CABLE . MOUNT .

1200kg marine grade 316 stainless steel anti corrosive, low geared winch, for easy function ability.

PVC coated 6mm stainless steel wire cable with pull tested thimble swaged end.

Stainless steel 6mm wall mounting plate TIG welded to the AS/NZS 1554.6 standard.



Diameter	Structure	Grade S/S	MBS* (kN)	MBS (kg) (approx)	WLL (kg) (vertical)	WLL (kg) (horizontal)
6.0MM	7x19	316	21.00	2150.0	215.0	107.5

# VOID MONITOR .

FAIL SAFE LATCH AND RETURN HINGE .

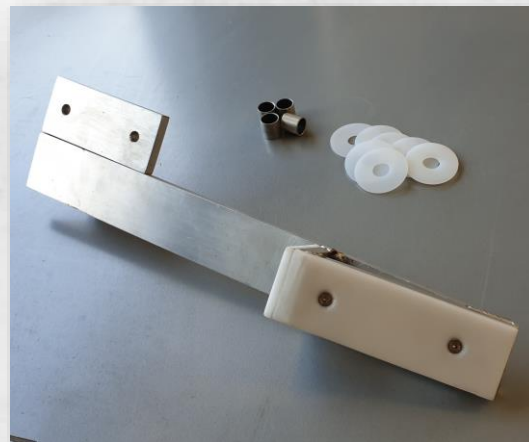
The Void Monitor has been fitted with a fail safe, anti fall, spring return latch, in case the main cable is damaged.

This has an additional cable that runs along a separate route, eliminating the risk of the frame from uncontrollably swinging down causing damage or injury.

As the frame is wound up the safety latch is automatically pushed back, once the frame has passed the safety latch it springs into the locking position.



Final design below ↓



# VOID MONITOR .

ELECTRICAL WIRING AND EQUIPMENT .

## Field

230V Power to Lights

4 Core + Earth Heavy Duty Steel Wire Armoured Cable.

24V Power & Comms to Lidar

PVC Coated Galvanized Steel Flex Conduit

2 Core Vulcanized Rubber for power

Shielded Cat6A for comms

## Enclosure

Mild Steel Powder Coated enclosures.

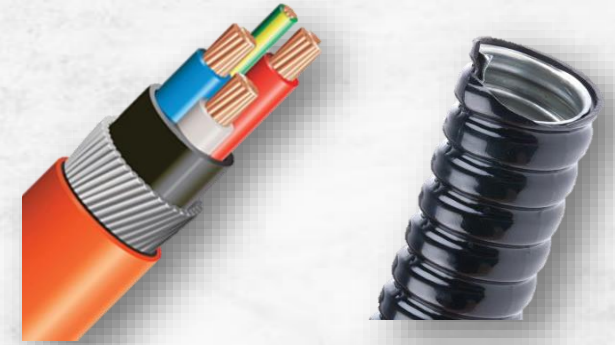
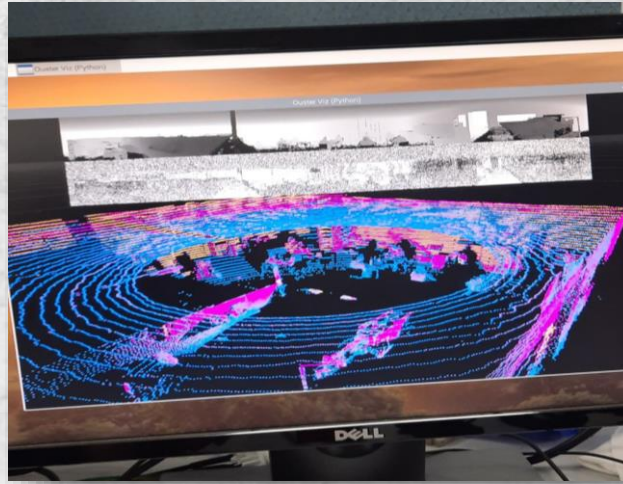
All fixings rated to an IP65 minimum.

Nylon glands and vent for standard corrosion resistance.

Entry points and vents located on bottom of enclosure to reduce risk of IP compromise.

Raspberry Pi for Lidar Data Processing.

Barth Industrial PLC with Phoenix Contact Relays for 230V switching.



MODBUS communication options available for System Integration.

Which will allow the Void Monitor's status to be viewed live from the control tower. Feeding back real time information and alerts on the tip point's condition.

# VOID MONITOR .

The Void Monitor has been sandblasted, coated with an industrial primer and painted in safety yellow 2 pack paint. This allows for great visibility and heavy duty wear and tear, in harsh and rugged environments.





# THE VOID MONITOR INSTALLING ONE TODAY COULD SAVE A LIFE TOMMOROW



...area is not safe to tip.

...the area has filled to its  
...the vehicle cannot proceed.

...presents that the void is structurally  
...of the vehicle is safe to proceed

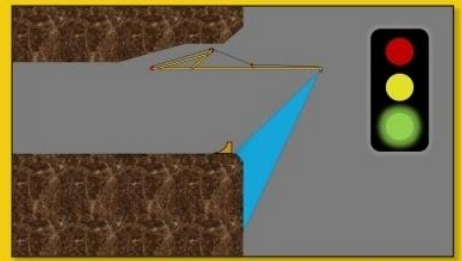
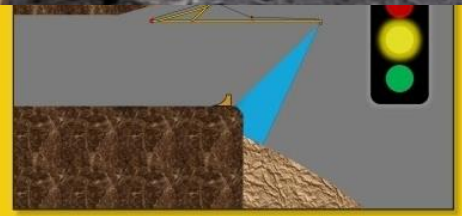
## VOID MONITOR LIDAR SCANNER

The Void Monitor continuously monitors the status of the void using a 3D lidar scanner to determine if the void is safe for a vehicle to be unloading.

When the Void Monitor is in the wound-up position, it is safely tucked to one side so as to be out of the way of tipping machinery.

## CONSTRUCTION

Built with anti-corrosive aluminium, specifically designed CNC parts and lubricated pieces, to



**VOID MONITOR**  
FAIL SAFE LATCH AND RETURN HINGE



Fail safe attachment with an additional cable release. In case the main cable is damaged.

Return hinge and over centre locking latch installed for access from behind the 3m exclusion zone to the LIDAR scanner for scheduled maintenance.