



CHAMBER OF MINES

Winch Signalling Learning And Experience

Presentation Date – 13 May 2015

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Darin Kruger – Principal Power Automation Engineer



WINCH SIGNALLING

RELIABILITY & SAFETY IMPROVEMENT INITIATIVE – SMALL GROUP ACTIVITY

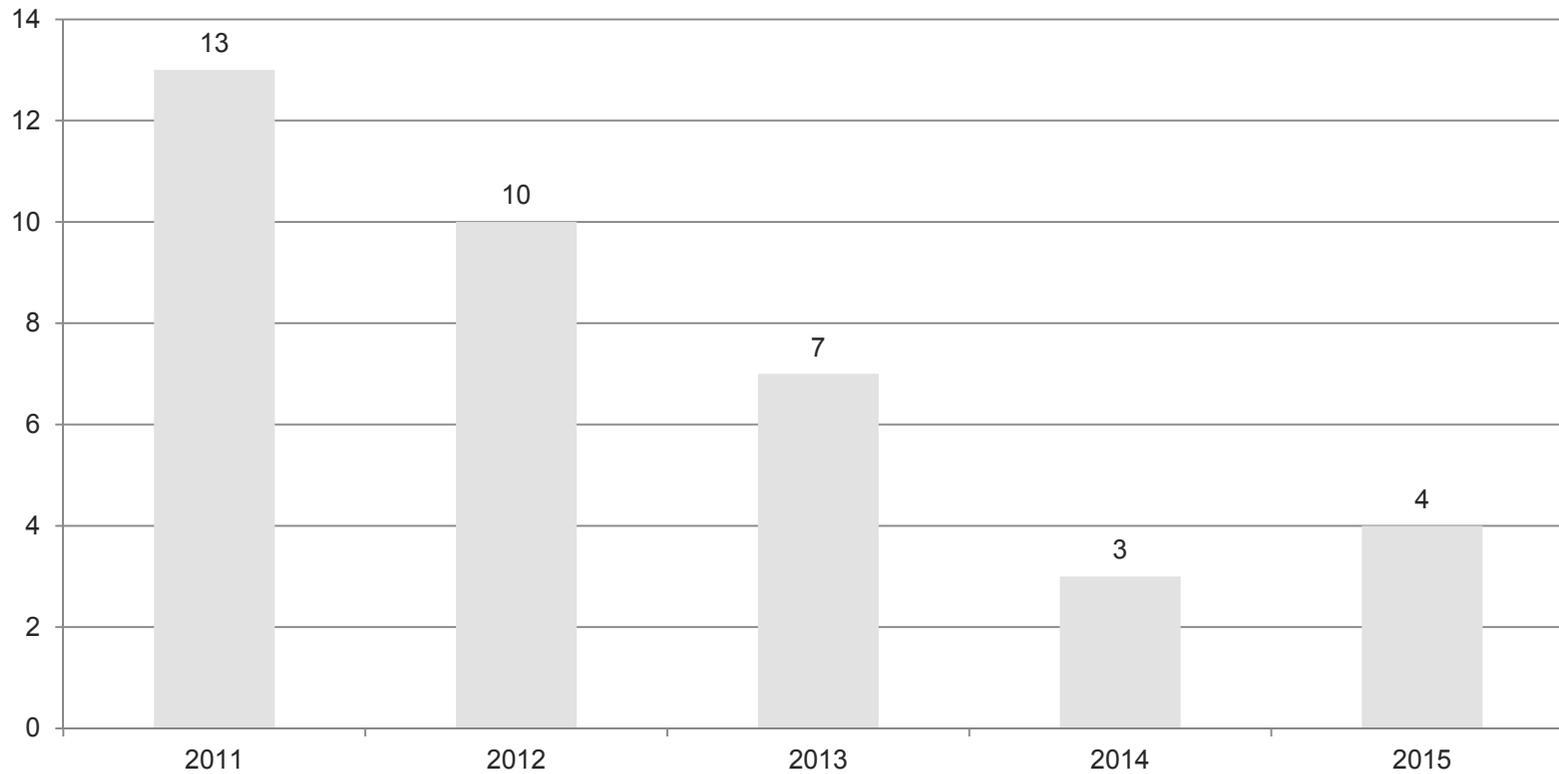
PRESENTATION OVERVIEW

- Safety.
- View of the DMR.
- Anglo American Platinum Process.
- Components of the winch signalling system.
- Typical Installations.
- Live Demonstration
- Change Management.
- Roll-out Plan
- Closure

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TUMELA MINE WINCHES AND ACCESSORIES RELATED INJURY STATISTICS



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RELIABILITY & SAFETY IMPROVEMENT INITIATIVE – SMALL GROUP ACTIVITY

CONCERNS REGARDING THE HIGH NUMBER OF FATALITIES AND ACCIDENTS RELATING TO WINCHES AND RIGGING



mineral resources

Department:
Mineral Resources
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Date: 09 October 2014

To: All Employers
All Employer Representatives
(North West Region – Rustenburg)

CONCERNS REGARDING HIGH NUMBER OF FATALITIES AND ACCIDENTS
RELATING TO WINCHES AND RIGGINGS.

- Start of 2014 to 9 October 2014:
 - 19 Serious injuries, 3 Fatalities.
 - Return to normal duties unlikely.
- Inadequate design of signalling systems:
 - Operator’s view is obscured.
 - Long pulls or in stopes.
- Impressed by Robot signalling system presented at Mine Safe Conference in August.
- Of the opinion that mines are unwilling to adopt best practice to safeguard employees.
- Urged mines to adopt best practices.
- Presentation to office of PI:
 - Reasons for refusal and how employees will be safeguarded.
 - Willing to adopt implementation plan with date of completion.

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ANGLO AMERICAN PLATINUM SMALL GROUP ACTIVITY APPROACH

1: Sponsor – Pieter Louw – Executive Director Mining

2: Project Leads –

- Design and Standards – Head of Electrical Engineering (Janna Kapp)
- Project lead – Installation – Engineering Managers

3: Team Full Time

- Project Coordinator – (Peter Dowling)

4: Stakeholders & Resources

- Safety Department Represented by Mr Clint Smith
- Operational Sites Represented by General Managers
- Rollout and implementation plan - Engineering Managers
- Feedback – Engineering managers / SEAM's
- Vits Maharaj, Dave Campher (Eng Management)

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WINCH SIGNALLING NON-NEGOTIABLE REQUIREMENTS

Reliable and robust system suitable for the environment it is deployed and effective in meeting the following minimum requirements:-

- ❑ **Status Indication**
 - ❖ Warn and alert persons in, at or near the scraper travel and return cable path when it is safe or not safe to enter.

- ❑ **Signalling**
 - ❖ Audible and visual signal exchange between winch operator and person interacting with scraper.
 - ❖ Ultimately communication via cap lamp being shone onto light sensitive element.

- ❑ **Tripping**
 - ❖ Allow tripping of the winch by person interacting with the scraper or person in distress or danger via bell wire or cap lamp shining directly onto light sensitive element. Reset should only be possible by operator after inspecting the scraper path.

- ❑ **Authorised Operation**
 - ❖ Only authorised operators can operate or reset the winch controller.

- ❑ **Lockout Operation**
 - ❖ Lockout shall be done via the current standard lock out procedure.

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WINCH SIGNALLING – THE PROCESS FOLLOWED

❑ Clear Needs Identification

- ❖ High risk work areas (**death triangle**), history of injuries, desire to improve the situation, management involvement and support and DMR motivation to improve the situation.

❑ Technical Requirements Clearly identified

- ❖ Internal information gathering process determined the operational needs for the various winch signal system applications. The “nice to have” wants were eliminated to get to a system that is suitable, fit for the intended purpose and meets the legal requirements.
- ❖ This process took 4 months due to the size of the organisation and determining what was critical and what was nice to have.

❑ Vendor Assessments

- ❖ Anglo Platinum has installed systems for three vendors and the decision was made to standardise on one supplier and to use this procurement position for improved pricing.
- ❖ A key issue in the assessment was a forward looking design that will cater for new technology that is entering the underground mining arena e.g. PDS via cap lamp RFID and the iLED (intelligent light emitting diode cable) technology.

❑ System Testing and Suitability

- ❖ Once we had decided on the vendor we took the vendors system through some underground installation tests, field tests and accelerated ageing tests. The system failed most tests it was subjected to initially.
- ❖ The system also did not meet all the technical and functional requirements we had laid down.

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WINCH SIGNALLING – THE PROCESS FOLLOWED

❑ System Redesign and Improvements

- ❖ A number of system changes and re-designs were embarked upon, some of the more significant being:
 - ❖ Starter box circuit changed from MCCB and under voltage to a DOL starter with overload and earth fault protection.
 - ❖ Firmware / software changes to meet functional needs for start-up procedure.
 - ❖ Firmware / software changes to meet functional needs for stop and lockout procedures
 - ❖ iLED cable re-design for improved sensitivity.
 - ❖ New field termination boxes on the iLED cable.
 - ❖ IP 56 and 66 rated plugs for field mounted devices.



❑ Final System Selection and Roll Out

- ❖ The improvements to the winch signalling system meant our technical requirements were now complied with.
- ❖ We could meet the legal and safety requirements and satisfy the DMR we were on the right road.
- ❖ The final system selection excluded the iLED cable due to remaining concerns about sensitivity and robustness of the design. It also excluded the telephone system which remains somewhat flimsy and requires a process to fully ruggedize the components and housing used for the environment.

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WINCH SIGNALLING – THE PROCESS FOLLOWED

❑ **Change Management**

- ❖ Anglo Platinum has an extensive and elaborate change management process which covers the following aspects:-
 - People requirements
 - Procedural requirements
 - Maintenance and spares
 - Operability
 - Risk management
 - Training
 - Environmental
 - Acceptance of new technology
 - Roll out plan

❑ **Costs and Budget Allocation**

- ❖ The budget process was fast tracked due to serious nature of this high risk work area and considerable capital and operational financial resources have been allocated to the rollout of this system.

❑ **Roll Out Plan & Implementation**

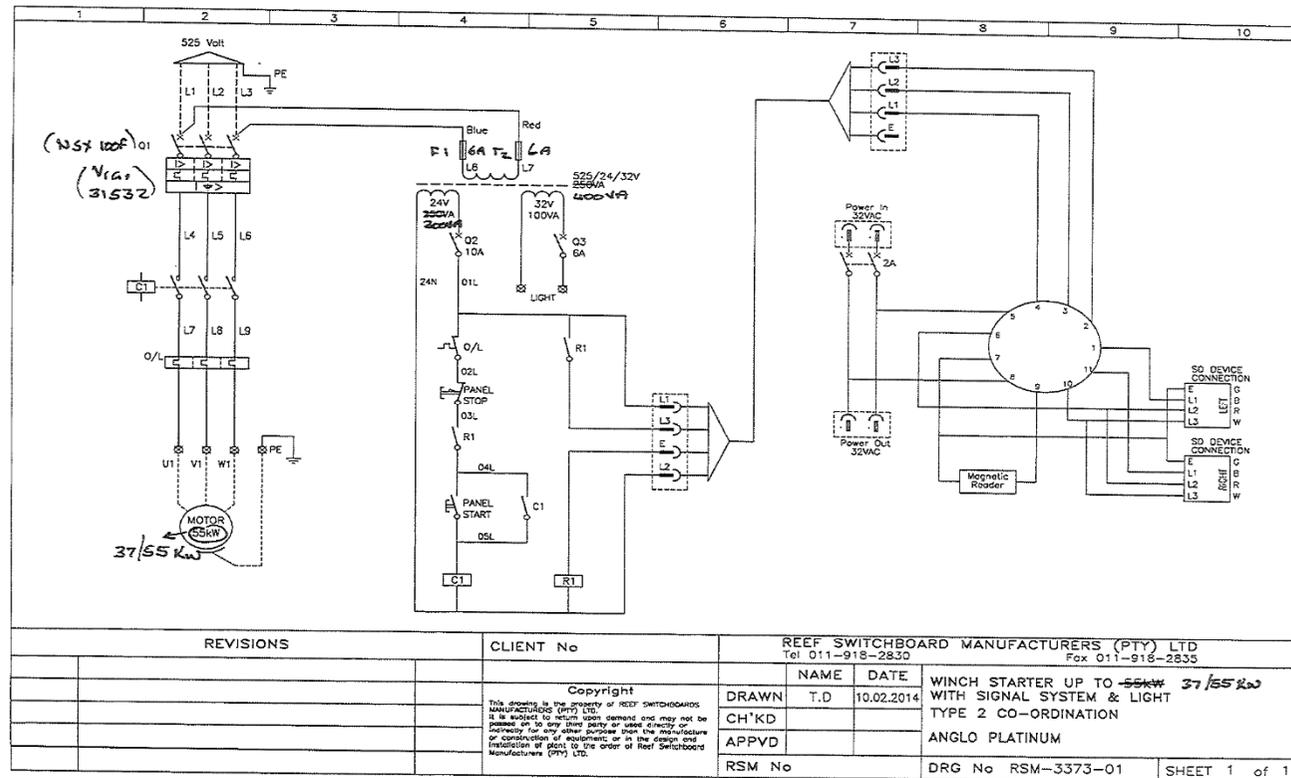
- ❖ The Four key elements we are which continue to pose challenges to the roll out plan are:
 - Vendor order placement and vendor capacity to deliver.
 - Training of all technical and operational staff
 - Installation and commissioning resources and durations

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ELECTRICAL CONSIDERATIONS AND CHANGES

DOL STARTER DESIGN FROM SIMPLE UNDER VOLTAGE



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WINCH SIGNALLING SYSTEM ACCELERATED AGEING TEST



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WINCH SIGNALLING SYSTEM FINAL SYSTEM COMPONENTS



1X
WINCH STARTER
535249818



1X
UNIVERSAL
CONTROLLER
533190421



2X
SIGNAL DEVICE I LED
7661900187



1X
40M EXTENSION
533190132



2X
5M EXTENSION
533190526

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CONNECTION OF COMPONENTS



- Standard winch starter retro-fit:
 - Harness with gland.
 - 24V transformer.



- OEM starter:
 - Red plug 24V.
 - Blue plug 32V.

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CONNECTION OF COMPONENTS

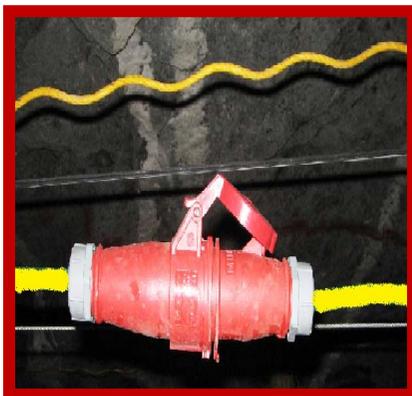


- Universal controller:
 - Plugs into winch starter.
 - Magnetic operator key reader.
 - 32V winch light plug
 - Left and right signal unit plugs
- Trip box
 - Data logger.
 - LCD display.
 - Indication of connected signal devices.

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CONNECTION OF COMPONENTS

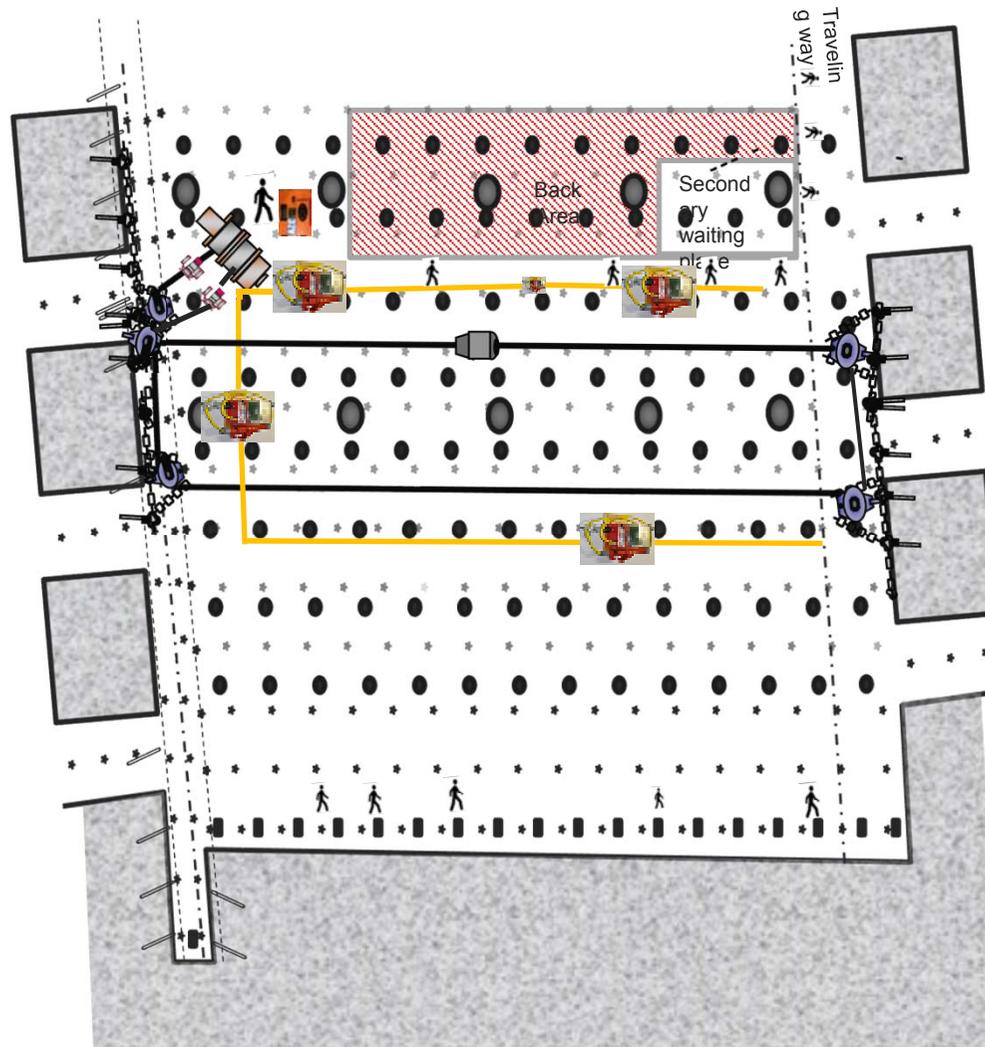


- Signalling device:
 - Plug into universal controller.
 - One each side of winch.
 - Connect bell wire and run along scraper path.
 - Red light - running.
 - Green light - safe to enter.
 - Flashing red at start-up.
 - Alternate green and red – locked out
 - Blue light if UVT is disabled.
- Winch light.
- Extension between signal devices.
 - Plug and play.

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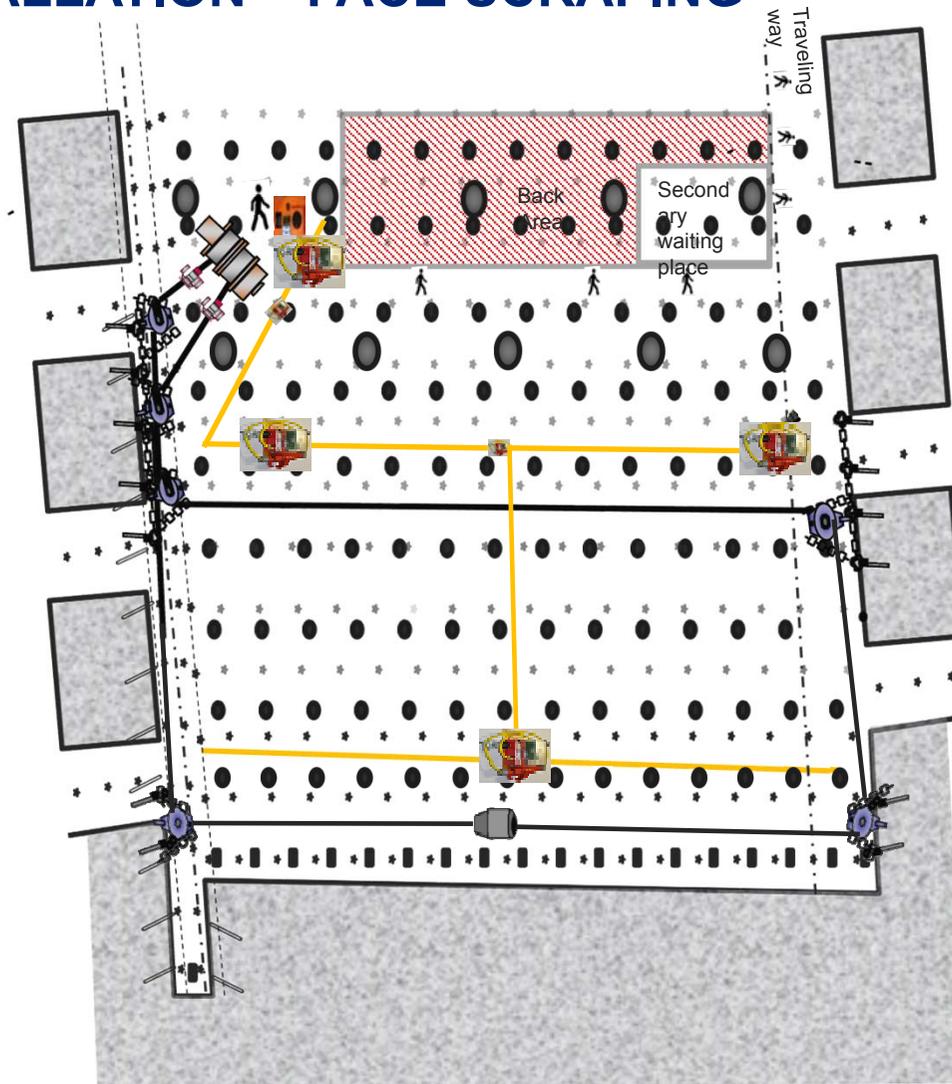
TYPICAL INSTALLATION - VAMPING



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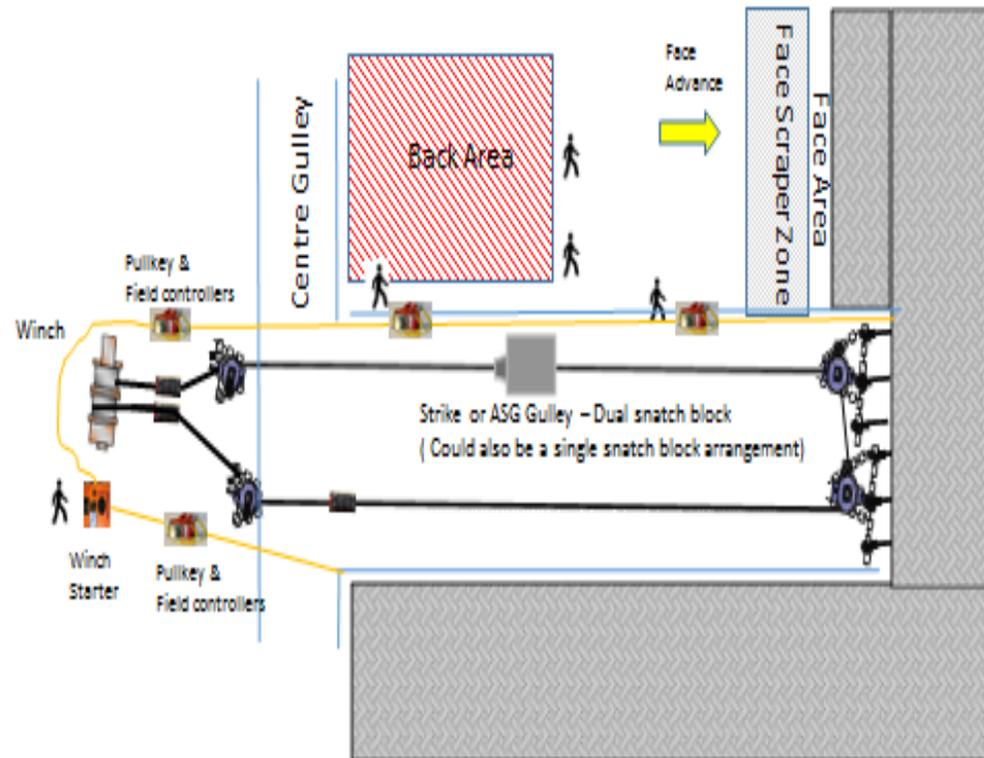
TYPICAL INSTALLATION – FACE SCRAPING



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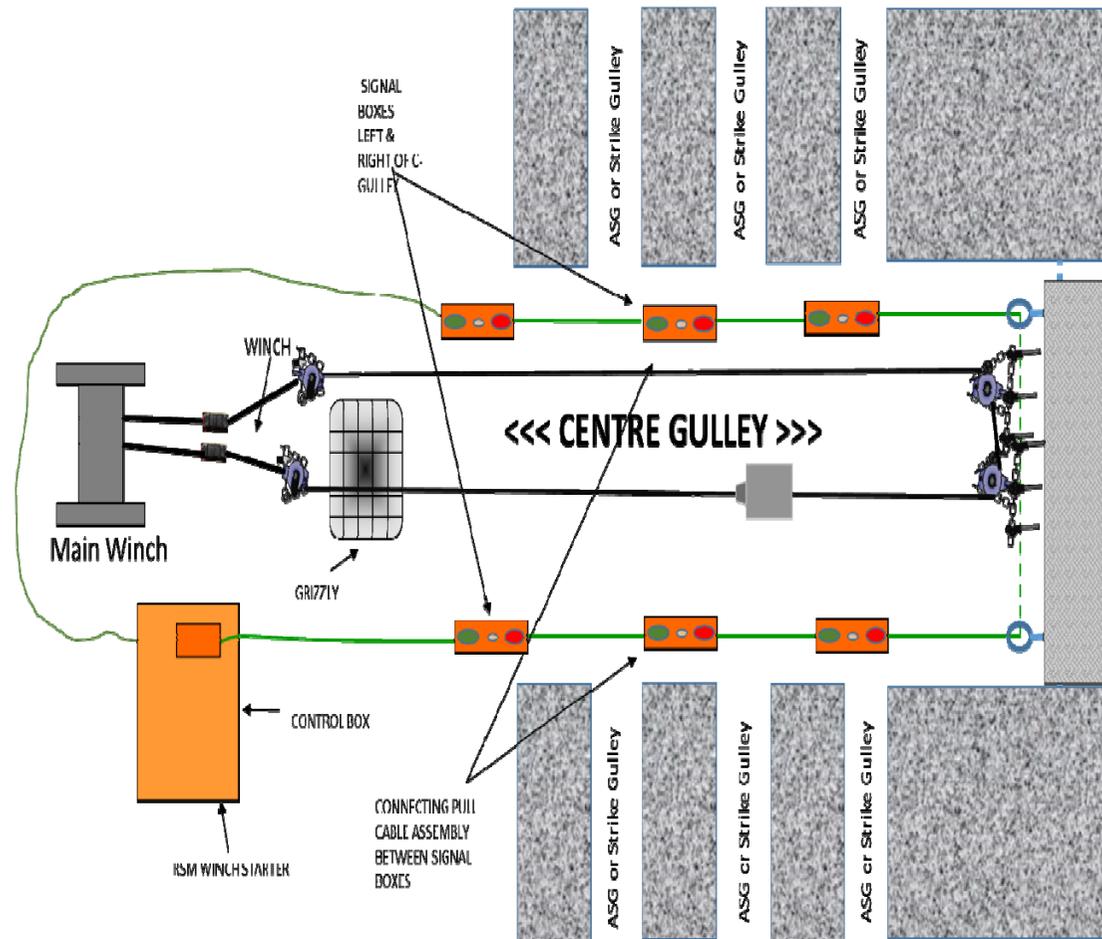
TYPICAL INSTALLATION – ASG SCRAPING



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TYPICAL INSTALLATION – CENTRE GULLY SCRAPING



LIVE DEMONSTRATION



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CHANGE MANAGEMENT PROCESS

Change Management Drivers	Status	Comments	Site Actions
User Requirements			
~Functional requirements	✓	Complete	
~Installation requirements / layout	✓	Complete	
Hardware & Functional Specifications			
Functional specification	✓	Complete	
~Fit for purpose design	✓	Complete	
~Reliable and predicatable operation	✓	Complete	
~~Accelearted aging test	✓	Final test on iLED outstanding	
~Failsafe Operation	✓	Final test on iLED outstanding	
Installation			
~Guidelines for installation	✓	Complete	
Spares			
Critical and operational spares	✓	Complete	
Training			
~Technical staff	✓	Modules completed	Site to roll out training plan
~Operational staff	✓	Modules completed	Site to roll out training plan
OEM Support			
~ Resources available from OEM	✓	Complete	
Feedback & Lessons Learnt			
~All lessons and changes documented	✓	Complete	

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INSTALLATION REQUIREMENT

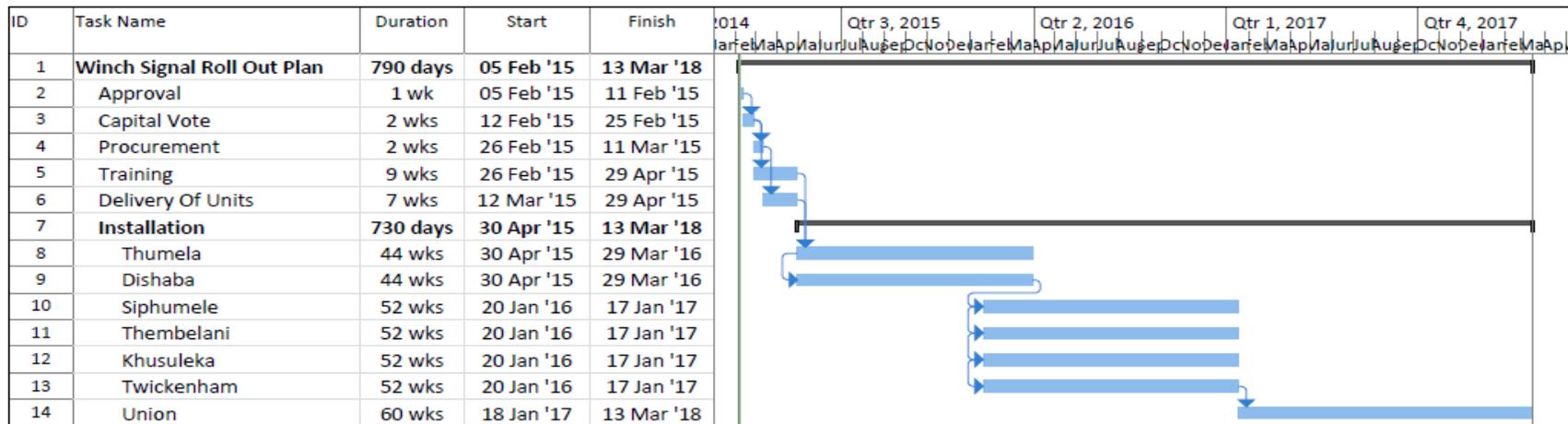
Mine	Operational Face Winch (with signal box)	Operational ASG / Gulley (single side per 50m) iLED compatible
Tumela Mine	211	211
Dishaba Mine	142	142
Union	180	180
Siphumelele Mine	75	83
Thembalani	94	94
Khuseleka	192	192
School of Mines	4	8
Hackney / Twickenham	20	37
Total	918	947

Note: Centre gulley installed already – Upgrades to WPD not included above .

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ROLL-OUT SCHEDULE



Project: Revision 3 Winch Signal In
Date: 06 Feb '15

Task		Inactive Task		Start-only	
Split		Inactive Milestone		Finish-only	
Milestone		Inactive Summary		Deadline	
Summary		Manual Task		Progress	
Project Summary		Duration-only		Manual Progress	
External Tasks		Manual Summary Rollup			
External Milestone		Manual Summary			

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CHALLENGES WITH MASS ROLL-OUT

- Supplier's ability to deliver
 - Approximately 80 systems per week maximum.
 - Quality control process.
- Single Supplier Risk – Option to retain and develop V&S.
- Overall costs
 - Approximately R48m
- Training and support
 - Train the trainers.
 - Two month training rollout program.
- Commissioning support.

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CONCLUSION

- Technology and system from WPD (excluding the iLED is ready to be rolled out).
- The training modules are rolled out into on site operator and technical training.
- The implementation plans for each site need to be carefully considered and detailed.
- The vendor (WPD) must be managed in strict accordance with our requirements for delivery deadlines and quality of material / systems delivered. Deliveries must be linked back to each site implementation plan which will ensure smoother production and deliver plan.
- The vendor service and support capabilities must be improved and confirmed in line with the written commitments made.
- Injuries sustained from scraper winch and accessories are severe and even fatal therefore every effort must be made to apply technology to eliminate the risk.

THANK YOU

