

# Scaling Automation Without the Big-Bang:

A Maturity Ladder for Zero Entry

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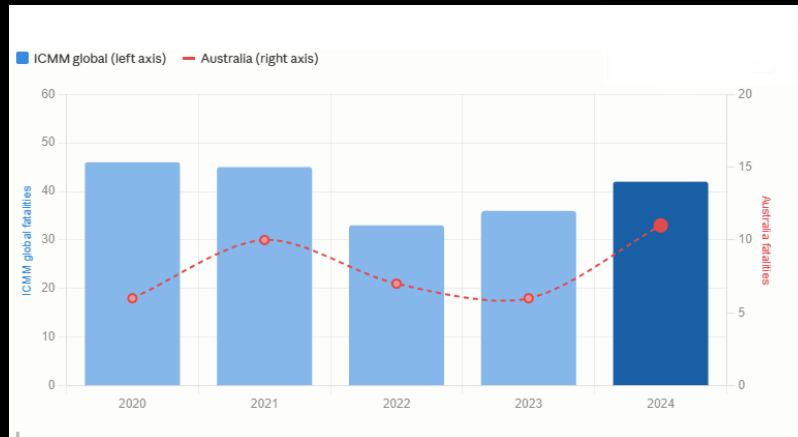


# The industry is not getting safer safer

# 11

## Australian mining fatalities in 2024

Nearly double the 6 recorded in 2023



**8/yr**

average Australian mining fatalities per decade -- the -- the trend has not improved

**80%**

of WA mining deaths since 2022 involved subcontractors

**3x**

safety resets in Queensland in 5 years -- little measurable result



# Two operations. Two world-class companies. Same outcome.

PAPUA, INDONESIA -- September 2025

*Block cave copper-gold operation*

# 800,000

metric tonnes of wet material rushed through multiple underground levels

7 lives lost | Force majeure declared | Production suspended suspended into 2027

Loaders Running on Automation

THE ANDES, CHILE -- July 2025

*World's largest underground copper mine*

# 900m

underground when a magnitude 4.2 seismic event collapsed a tunnel

6 lives lost | National government halted all underground underground operations

No Automation

*You cannot safety-manage your way out of a mud rush. You cannot train your way out of a seismic event 900 metres below surface. The only answer is to remove the exposure.*

# The Sandvik Zero Entry System



No single product.  
One integrated system.

	UFR	AutoMine	Newtrax	Deswik	Polymathian
Whole of system thinking	YES	YES	YES	YES	YES
Interoperability	YES	YES	YES	YES	YES
Agnostic automation	YES	--	YES	--	--
Multitasking robots	YES	YES	--	--	--
Modular design	YES	YES	YES	YES	--
Autonomous maintenance & recovery	YES	YES	--	--	--
More sensors and data	YES	YES	YES	--	YES
Digital orchestration	--	YES	--	YES	YES

*Together, these five platforms form the only end-to-end zero entry system available from a single strategic partner.*



THE CONVERSATION  
THAT CHANGED  
EVERYTHING

***"You wouldn't even  
be at this table."***

*A major global copper group  
on OEM agnostic automation*

## What OEM agnostic automation actually means

### WITHOUT OEM AGNOSTIC CAPABILITIES

- Mixed fleets cannot be automated as one system
- Traffic management breaks at OEM boundaries
- Safety zones cannot span different machine types
- Zero-entry remains out of reach for most mines

### WITH UFR AUTONOMY + AUTOMINE ACS 3

- UFR Autonomy™ kit plugs any OEM machine into AutoMine
- Competitor machine appears as close to native as possible
- AutoMine® becomes the single orchestration platform
- ACS 3 safety framework covers every machine, every brand

**One system. One safety framework. Every machine.**

# Sandvik is the clear leader in autonomous underground mining



# #1

globally

More autonomous underground operations than any other single vendor

# 130+

mines running AutoMine®

Over 20 years of proven performance in the world's harshest mines

# 9M+

LTI-free hours

The industry's most significant autonomous autonomous safety milestone

## PROVEN IN AUSTRALIA

### George Fisher Mine

Mount Isa, QLD

Glencore underground zinc-lead-silver

Automine® Multi Lite

### ByrneCut Operations

Multiple sites, WA & SA

Contract mining - multiple orebodies

Automine® Multi Lite

### MMG - Dugald River

Cloncurry, QLD

Underground Zinc-Lead-Silver

Automine® Multi Lite

### Evolution - North Parkes Parkes

New South Wales

Block cave copper-gold

Automine® Fleet



# You don't have to leap. You climb.

The AutoMine® Maturity Ladder

GMG L4-5

**AutoMine® Core + ORB + UFR**

Operator model: System operates itself

+20% on Core

GMG L3

**AutoMine® Multi-Lite**

Operator model: 1 operator : many machines

1:N leverage

GMG L2-3

**AutoMine Lite® / Lite 2.0 /UFRautonomy™**

Operator model: 1 operator : 1 machine

24/7 cycles

GMG L1-2

**AutoMine® Tele-Remote /UFRautonomy™**

Operator model: Operator assisted

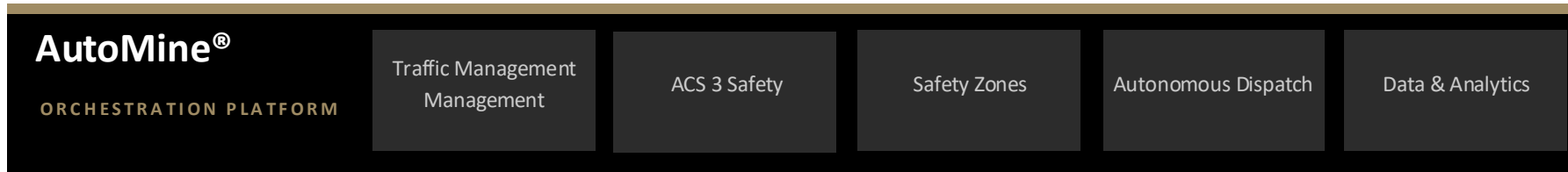
Blast hours back

*Every investment compounds. Tele-Remote builds to Lite. Lite builds to Multi-Lite. No rip-and-replace.*

# OEM Agnostic Automation: Every Machine. One System.



AutoMine® orchestrates everything. UFRautonomy™ plugs in any machine that wasn't built for it.



**SANDVIK NATIVE FLEET**  
*i-Series machines - integrated by design*

- OK Toro LH loaders & TH trucks**  
i-Series - native AutoMine integration
- OK AutoMine Drill Fleet**  
DL i-Series longhole drills -- same traffic mgmt system
- OK Other Sandvik i-Series equipment**  
Full AutoMine native connectivity

VS

**UFR Autonomy™**  
ANY MACHINE INTO AutoMine®

- COMPETITOR**  
**Competitor Loaders & Trucks**  
Any OEM machine plugged into AutoMine as close to native as possible.
- ANCILLARY**  
**Water Cannons**  
McLean's water cannon currently in deployment. Operator removed from active draw zones entirely.
- Non iSeries**
  - DB331 – Full Tele Remote Capabilities
  - LH209L
- CUSTOM**  
**Other Ancillary & Specialist**  
Any machine not built for AutoMine. UFR's common platform adapts to non-standard equipment.

AutoMine is the orchestration platform. UFR Autonomy is the universal on-ramp. Together they make zero-entry possible regardless of fleet mix.



*Can we afford to automate?*

*becomes*

# Can we afford NOT to automate?

## Human cost

**13 lives**

Lost in Papua and Chile in 2025

## Production cost

**35%**

Forecast drop in output at Grasberg in 2026 -- one incident, incident, global copper supply impacted

## Financial cost

**\$700M**

Underground incident insurance cap -- after a \$500M deductible

## Market cost

**3-4%**

Copper price spike in a single trading session following the Indonesia force majeure declaration

# The nervous system and the brain of a zero-entry mine



## NEWTRAX - OEM-agnostic IoT (Telemetry)

### *The nervous system*

- Personnel tracking - every person, every shift
- Vehicle tracking and telemetry - Sandvik and non-Sandvik
- Machine health monitoring in real time
- Collision Avoidance System with vehicle intervention
- OEM agnostic - works with your entire fleet

## DESWIK - Mine planning & design

Design the mine for the automation level you are heading to, heading to, not where you are today. 3D stope design, scheduling, and sequencing built for autonomous operation.

## POLYMATHIAN ORB - Autonomous dispatch

**+20% mine productivity uplift**  
**uplift**

at a major Australian block cave operation (Polymathian published case study)

*ORB treats the fleet as one unified team -- optimising draw targets, geotechnics, and crusher capacity simultaneously in real time. No human dispatcher required.*



# Zero-entry doesn't stop at the production face.

1

## Machines that know when to leave

Future UFR robots will recognise when they need service and return themselves to a surface bay autonomously. No rescue mission. No person sent underground to retrieve a broken machine.

2

## Robots servicing robots

Modular machine design will allow components to be swapped by other robots in a safe service area. Maintenance becomes machine-to-machine. People enter on their terms -- by choice, not because something went wrong.

3

## The true definition of zero-entry

Not just zero people at the production production face. Zero unplanned human presence underground. Every interaction between people and the mine is deliberate, scheduled, scheduled, and safe. That is the vision Sandvik and UFR are building building toward.

*This is where UFR and Sandvik are headed. Not products yet - a direction. And the only direction that makes sense.*

# Where are you on the ladder - and what is your next rung?



The barriers are rarely the technology.

## Mine design

Legacy geometry was not built for automation. Drive widths, passing bays, ore pass placement - these need to be reviewed for AutoMine® compatibility. Deswik helps you model this before you spend a dollar on equipment.

## Connectivity

Autonomous operations require stable underground networks. Wi-Fi, 4G/LTE, 5G or mesh - this is infrastructure investment, not an afterthought. It needs to be in the plan from the start.

## Change management management

The technology is not the hard part. The workforce transition is. Operators become automation supervisors. Sandvik's Automation Learning Solutions was built for this.

## Courage to start

The ROI model feels incomplete before you have begun. But every mine running AutoMine® today started at today started at Tele-Remote with one machine. The data comes once you are moving.

All of these are solvable - and the sooner you start, the more you get to choose your pace.



# 9,000,000

*That's not a statistic.*

That is 9 million hours where someone went home.

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Scan to connect

