

A large mining truck is positioned in a tunnel, with a blue overlay across the entire image. The truck is facing right, and its headlights are on. The tunnel walls are lined with a wire mesh. The text is overlaid on the left side of the image.

# **VENTSIM INTEGRATION IN RPM MINEPLANNER: Using RPM MinePlanner To Generate A Ventsim Model**

**HELEN RESTALL**

**RPMGLOBAL**  
ADVANCING MINING



# GLOBAL FOOTPRINT



*“Our goal is to advance the industry by delivering safer, more efficient and more sustainable operations.”*

# DIVERSIFIED CLIENT BASE

## GLOBAL RESOURCE LEADERS

GLENCORE



RioTinto

BHP



## GLOBAL COMMODITY LEADERS

### Coal & Energy



exxaro



Teck



### Iron Ore



RioTinto



### Gold, Copper & Metals

Newmont

BARRICK



### Oil Sands, Potash & Diamonds

Synocrude

Mosaic



DEBSWANA

DE BEERS GROUP

## GLOBAL MINING CONTRACTORS



## ORIGINAL EQUIPMENT MANUFACTURERS & DEALERS

HITACHI

CATERPILLAR

KOMATSU



Epiroc

LIEBHERR

## JV PARTNERS



posco

Sumitomo

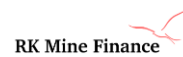
FOSUN 复星



## FINANCIAL INSTITUTIONS



J.P.Morgan





## GLOBAL CLIENT BASE

COAL & ENERGY, IRON ORE,  
COPPER, GOLD & METALS,  
DIAMONDS, OIL, POTASH,  
PHOSPHATE



**50<sup>+</sup>** | **125**  
YEARS | COUNTRIES

**24** OFFICES  
WORLDWIDE

## OUR DIFFERENCE



SOFTWARE  
ADVISORY &  
TRAINING

## DEEP DOMAIN EXPERTISE

INNOVATION & SUSTAINABILITY



MINING SPECIFIC  
**ESG**  
DIVISION



ADVANCING  
MINING

## DIGITAL CONNECTED MINE

**1** INTEGRATED  
PLATFORM SOLUTION  
FOR THE ENTIRE MINING VALUE CHAIN

ISO27001  
CERTIFIED



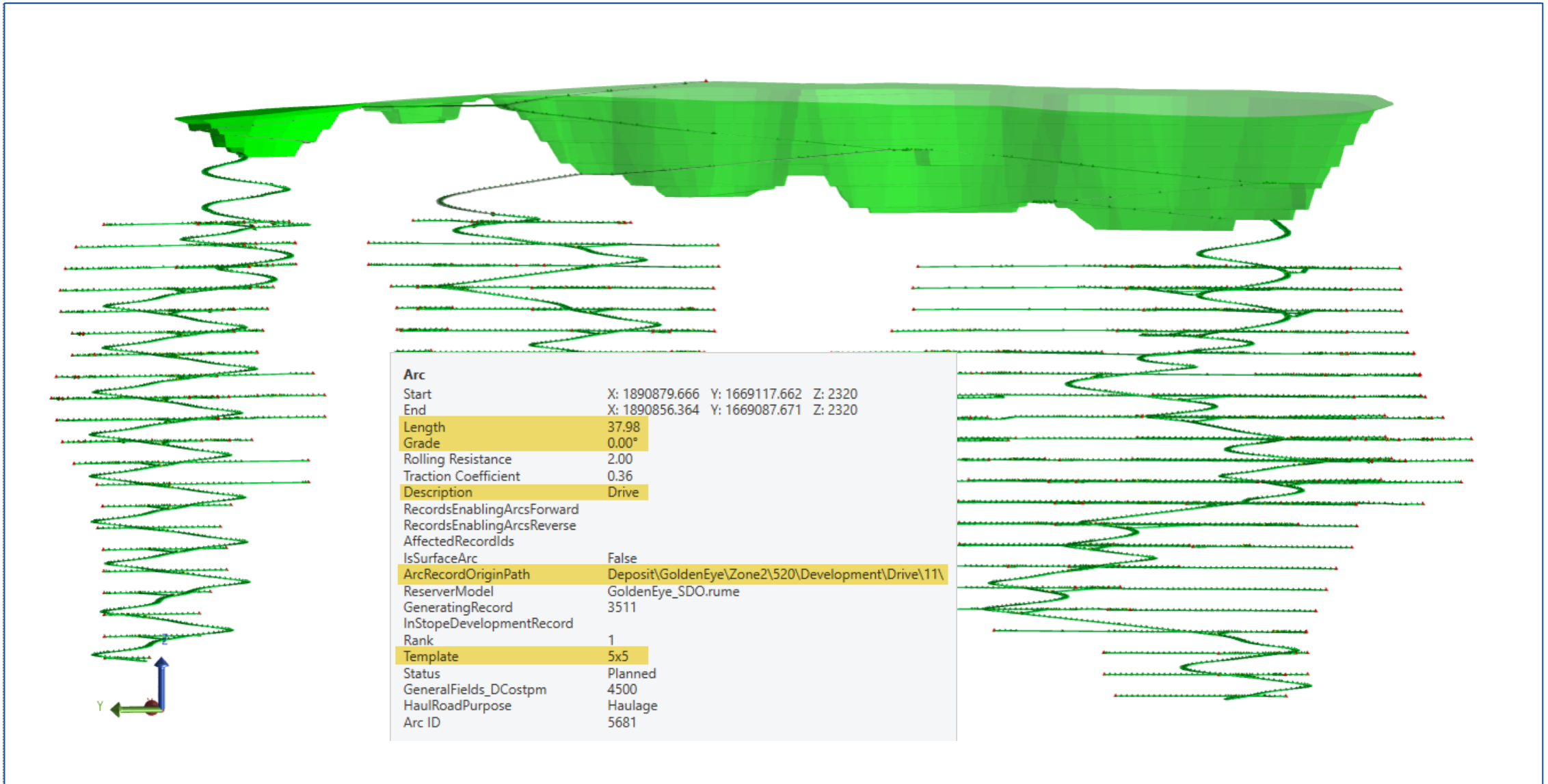
 **CLOUD**  
ENTERPRISE, MOBILE & SAAS

# EVOLUTION OF MINEPLANNER

RPM has been providing planning and scheduling solutions to the mining industry for over 40 years



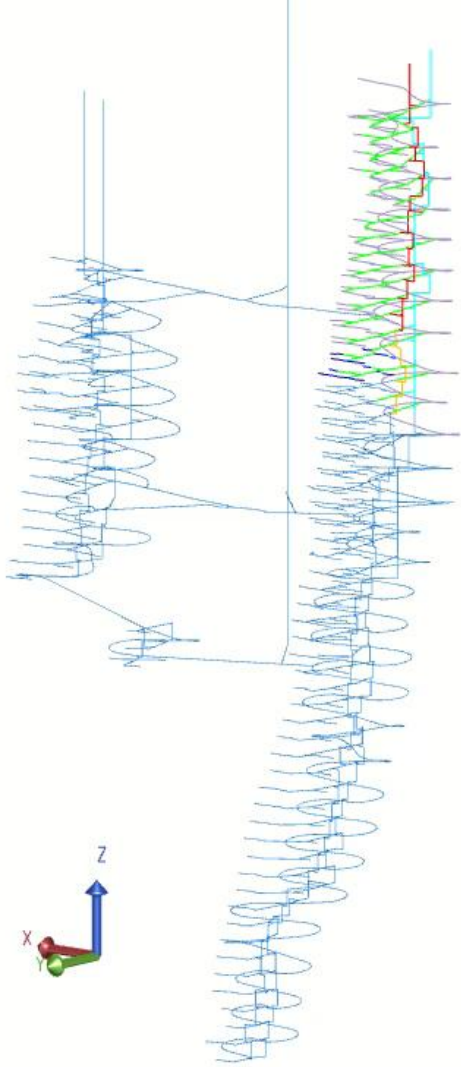
# CONNECTED DEVELOPMENT NETWORK



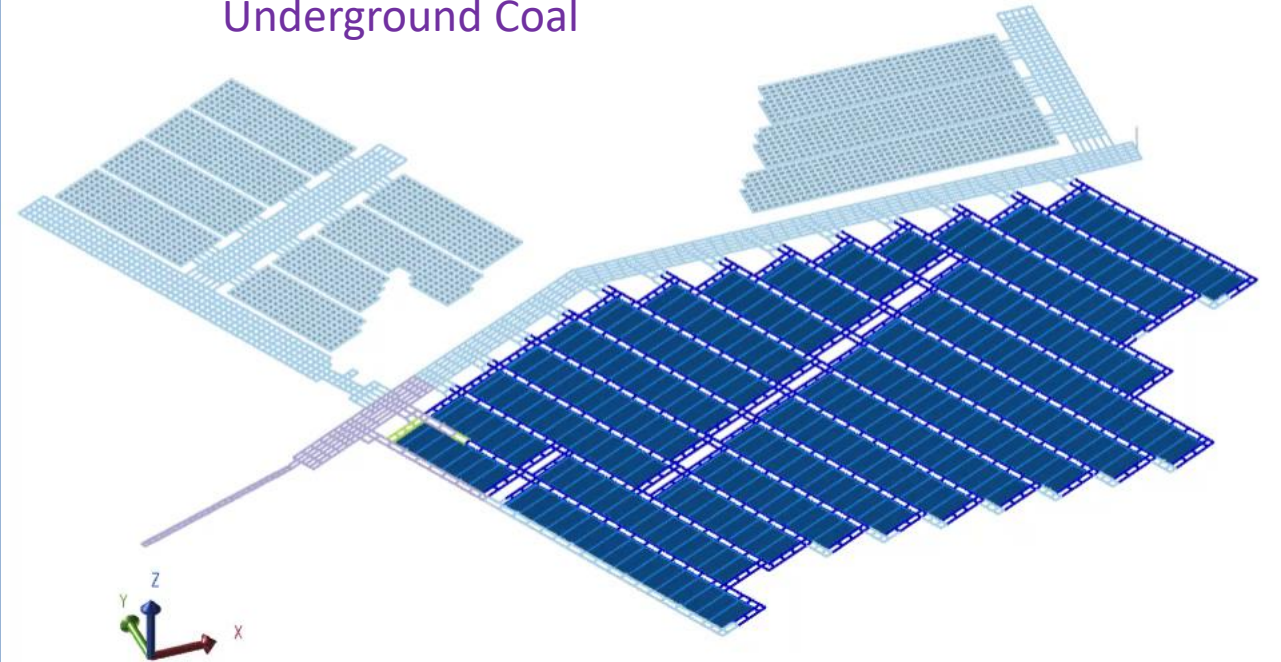


# MINEPLANNER SCHEDULE ANIMATIONS

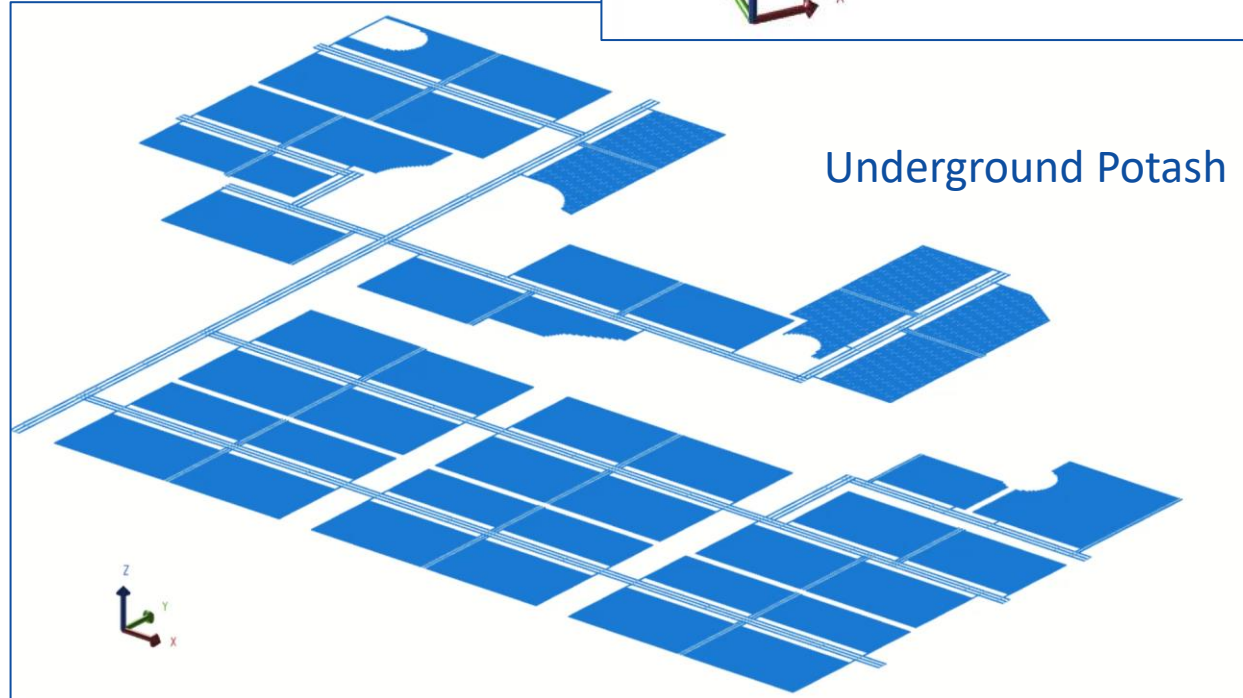
Underground Metals



Underground Coal



Underground Potash



# CONFIGURE SCHEDULE FOR VENTSIM

Battery Limits LOM - Battery Limit\_MP-v1 - MinePlanner Scheduling Configured for Underground Metals

Home Import & Export Debug

Run Process Hide Documentation Explorer Tree Notes Log Viewer Reset Application Dock State Reset Step Dock State Databases Feature Layers Legends Annotations Record Filters Log Plot Performance Bypass RVS

Actions Views Project Items Logging

Process x Log Viewer Documentation Notes

Configure for Ventsim

1. Configure Scheduling Reserves  
 2. Configure Haul Network  
 3. Establish Schedule Configuration  
 4. Establish Schedule Start Status  
 5. Establish Mining Rules  
 6. Establish Objectives  
 7. Execute Schedule  
 8. Analyse Schedule  
 1. Review Schedule Dashboards  
 2. Review Schedule Plots  
 3. Review Schedule Reports  
 4. Validate Schedule With Simulation  
 5. Export to Ventsim  
 9. Publish Schedule  
 1. Publish Reports  
 2. Define EPF Transfer Templates  
 3. Validate and Publish Data

General

Airway Names

Layer Names

Dead Ends/Stubs

Staging

Use Staging  Yes  No

Staging Type  Unique  Share

Include Final Stage  Yes  No

Stages

| Date | Stage Name                                 | Event Name                                       | Record                           | Description   |
|------|--|--|----------------------------------|---|
| 1    | < End of Actuals >                         |  |                                  | < End of Actuals >                                      |
| 2    | < End of Preschedule >                     |  |                                  | < End of Preschedule >                                  |
| 3    | 2024/02/01 00:...                          | End of Calendar period 13: 2/1/2024 (2024\Qtr... | Top\2024\Qtr1\Jan                | End of Calendar period 13: 2/1/2024 (2024\Qtr1\Jan)     |
| 4    | 2025/02/01 00:...                          | End of Calendar period 25: 2/1/2025 (2025\Qtr... | Top\2025\Qtr1\Jan                | End of Calendar period 25: 2/1/2025 (2025\Qtr1\Jan)     |
| 5    | 2026/02/01 00:...                          | End of Calendar period 37: 2/1/2026 (2026\Qtr... | Top\2026\Qtr1\Jan                | End of Calendar period 37: 2/1/2026 (2026\Qtr1\Jan)     |
| 6    | 2027/02/01 00:...                          | End of Calendar period 49: 2/1/2027 (2027\Qtr... | Top\2027\Qtr1\Jan                | End of Calendar period 49: 2/1/2027 (2027\Qtr1\Jan)     |
| 7    | 2028/02/01 00:...                          | End of Calendar period 61: 2/1/2028 (2028\Qtr... | Top\2028\Qtr1\Jan                | End of Calendar period 61: 2/1/2028 (2028\Qtr1\Jan)     |
| 8    | 2029/02/01 00:...                          | End of Calendar period 73: 2/1/2029 (2029\Qtr... | Top\2029\Qtr1\Jan                | End of Calendar period 73: 2/1/2029 (2029\Qtr1\Jan)     |
| 9    | 2030/02/01 00:...                          | End of Calendar period 85: 2/1/2030 (2030\Qtr... | Top\2030\Qtr1\Jan                | End of Calendar period 85: 2/1/2030 (2030\Qtr1\Jan)     |
| 10   | 2031/02/01 00:...                          | End of Calendar period 97: 2/1/2031 (2031\Qtr... | Top\2031\Qtr1\Jan                | End of Calendar period 97: 2/1/2031 (2031\Qtr1\Jan)     |
| 11   | 2032/02/01 00:...                          | End of Calendar period 109: 2/1/2032 (2032\Qt... | Top\2032\Qtr1\Jan                | End of Calendar period 109: 2/1/2032 (2032\Qtr1\Jan)    |
| 12   | 2033/02/01 00:...                          | End of Calendar period 121: 2/1/2033 (2033\Qt... | Top\2033\Qtr1\Jan                | End of Calendar period 121: 2/1/2033 (2033\Qtr1\Jan)    |
| 13   | < End of Schedule >                        |  |                                  | < End of Schedule >                                     |
| 14   | Deposit\Sat\440\Development\RARaccess\7... | Connect Mid Z...                                 | Deposit\Sat\440\Development\R... | Deposit\Sat\440\Development\RARaccess\7 mining finished |
| 15   | Deposit\Sat\540\Development\RARaccess\3... | Connect Lower...                                 | Deposit\Sat\540\Development\R... | Deposit\Sat\540\Development\RARaccess\3 mining finished |

Add Schedule Events...  
 Add Periods...  
 Add Date...  
 Remove

Staging Type  Unique  Share

Include Final Stage  Yes  No

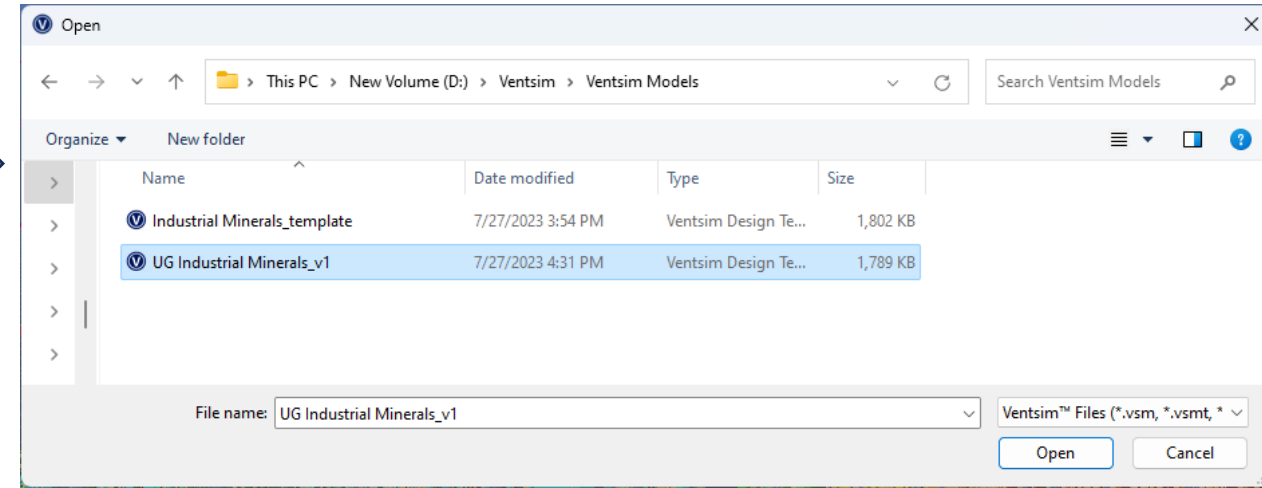
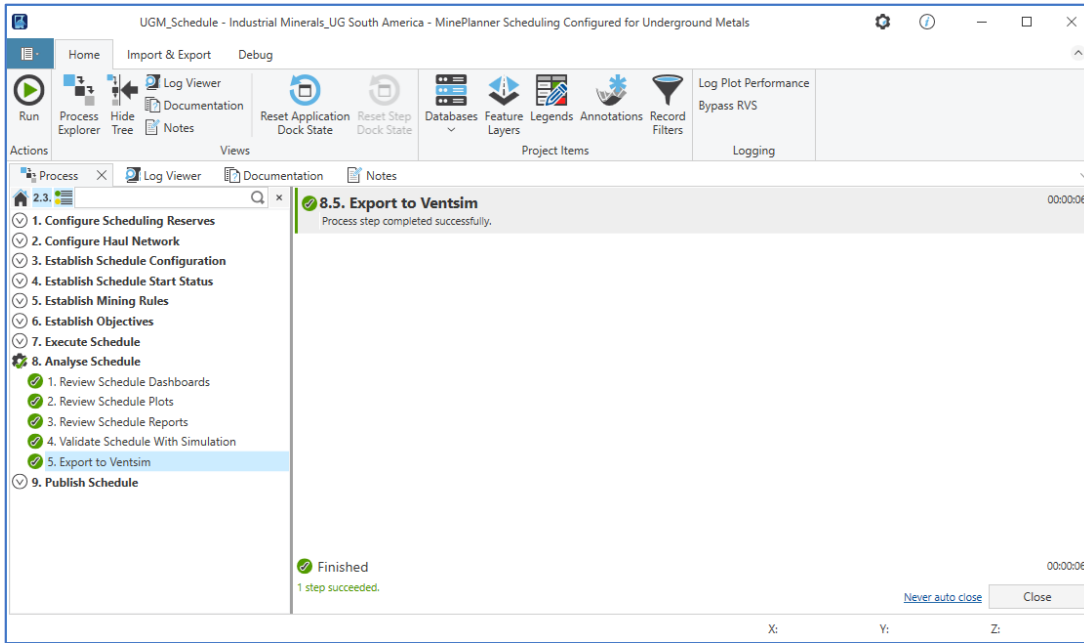
Stages

| Date | Stage Name | Event Name | Record | Description |
|------|------------|------------|--------|-------------|
|      |            |            |        |             |

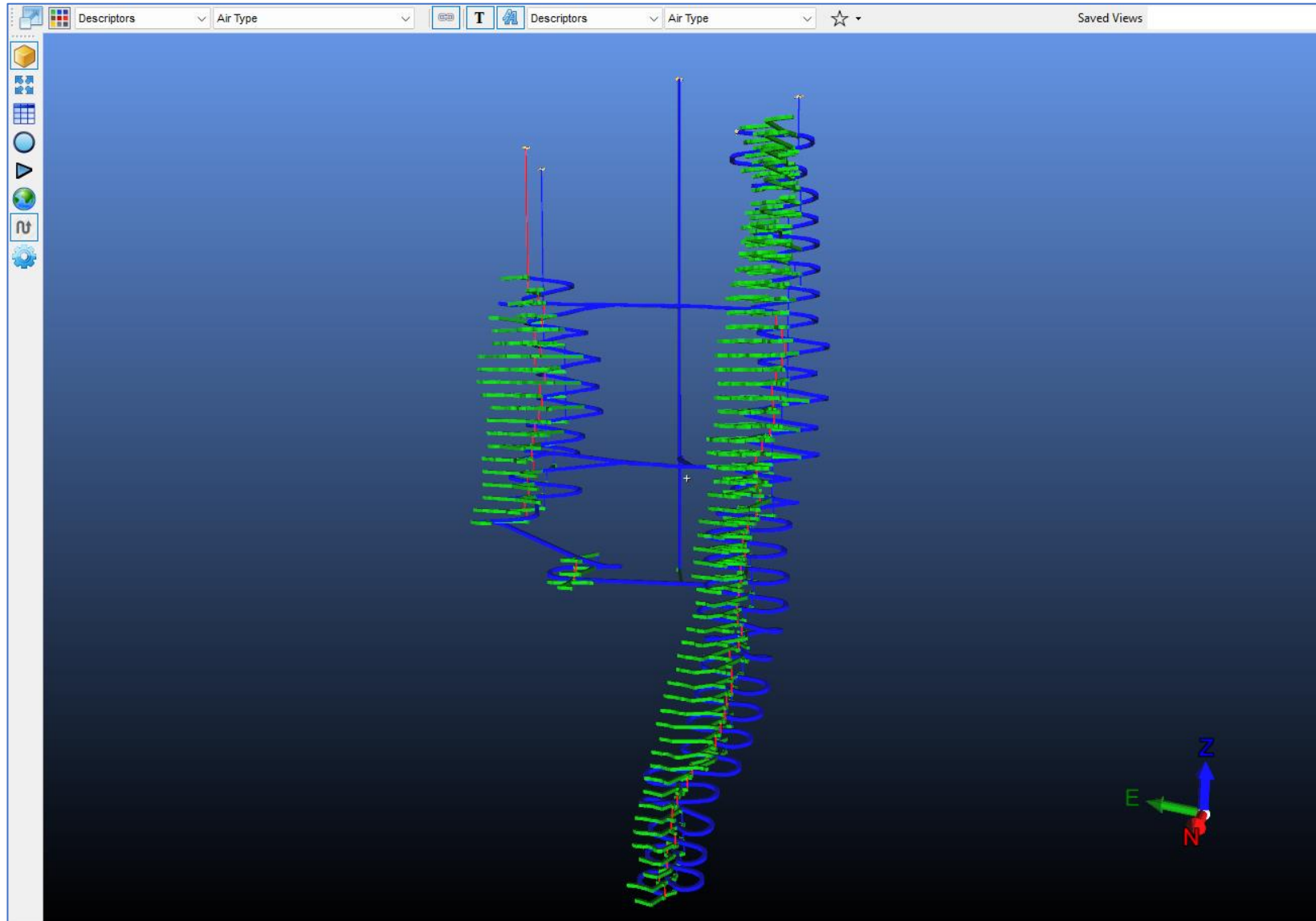
Add Schedule Events...



# EXPORT FROM MINEPLANNER TO NATIVE VENTSIM FORMAT



# UNDERGROUND AIRWAYS IN VENTSIM



# EXAMPLE OF DATA INCLUDED IN VENTSIM

Ventsim DESIGN 5.4 - BatteryLimit\_MinePlanner to VENTSIM.vsm

File Edit View Saved Views Run Connect Tools Settings Window Help Stage Final

EDIT - 1 Airways, 87.3 m

Ventsim DESIGN Preset Values

| # in use     | Primary Layer Name | DisplaySet                          | Color |
|--------------|--------------------|-------------------------------------|-------|
| 6103 (77...) | Decline            | <input checked="" type="checkbox"/> |       |
| 64 (86)      | FAR                | <input checked="" type="checkbox"/> |       |
| 42 (66)      | RAR                | <input checked="" type="checkbox"/> |       |

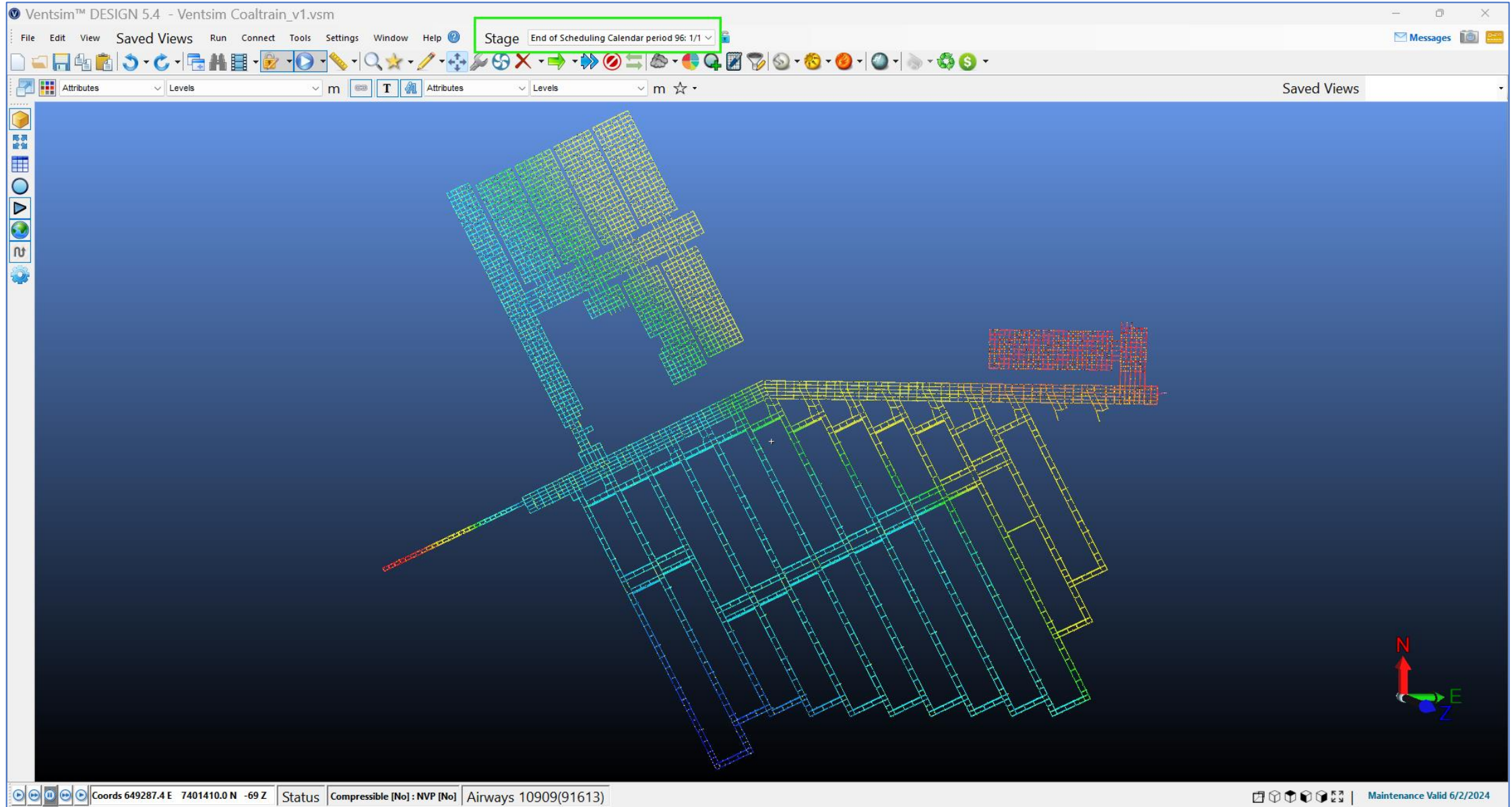
Ventsim DESIGN Preset Values

| # in use    | Secondary Layer Name | DisplaySet                          | Color |
|-------------|----------------------|-------------------------------------|-------|
| 3406 (4235) | Oreaccess            | <input checked="" type="checkbox"/> |       |
| 2144 (2564) | Oredrive             | <input checked="" type="checkbox"/> |       |
| 287 (513)   | FARaccess            | <input checked="" type="checkbox"/> |       |
| 372 (551)   | RARaccess            | <input checked="" type="checkbox"/> |       |

Coords 10537.7 E 4731.0 N -546 Z Status Compressible [No] : NVP [No] Airways 7863



# UG COAL – EXAMPLE OF STAGES SENT FROM MINEPLANNER



# UG POTASH

The screenshot displays the Ventsim DESIGN 5.4 interface for a 'UG Potash Demo Model'. The main window shows a 3D perspective view of a mine layout with various airways and rooms. A status bar at the bottom indicates 'Air simulation successful 4 iterations' and 'Airways 6393(8245)'. A right-hand panel titled 'EDIT - 1 Airways, 4,152.1 m' provides detailed configuration for a selected airway. The 'Airway' section shows the name 'A\A02\BelRoads\2\1\2'. The 'Size' section lists 'Airway Shape' as 'Rectangular Horizontal', 'Width (m)' as 45.00, and 'Height (m)' as 8.00. The 'Layers' section shows 'Air Type' as 'Exhaust', 'Primary Layer' as 'BelRoads', and 'Secondary Layer' as 'Crosscuts-L'. The 'Options' section has 'Length (m)' set to 4,152.1. The 'Attributes' section shows 'Resistance (Ns²/m8)' as 0.00011 (Auto) and 'Friction Factor (kg/m³)' as 0.0120 (Auto). The 'Simulation' section shows 'Q (m³/s)', 'V (m/s)', and 'P Loss (Pa)' all set to 0.0, and 'R (Ns²/m8)' as 0.00011. A 'Simulate' button is visible at the bottom of the panel.

| Property                | Value   |
|-------------------------|---|
| Name                    | A\A02\BelRoads\2\1\2                                |
| Entry Name              |   |
| Exit Name               |   |
| Index Number            | 1487  |
| Unique Number           | 11392   |
| Data Box                |   |
| Stage                   | 1/1/2033 1:36:18 PM, Deposit\F\1-3\Rooms-R\3-30\3\1 |
| Help                    | Watch Webinar                                       |
| Tunnel Type             | Custom  |
| Airway Shape            | Rectangular Horizontal                              |
| Width (m)               | 45.00   |
| Height (m)              | 8.00  |
| Area (m²)               | 360.0   |
| Obstruct (m²)           | 0.0   |
| Rotation (°)            | 0.0   |
| Backfill (%)            | 0.0   |
| Parallel Airways        | 1   |
| Air Type                | Exhaust   |
| Primary Layer           | BelRoads  |
| Secondary Layer         | Crosscuts-L   |
| Surface                 | <input type="checkbox"/>                            |
| Close End               | <input type="checkbox"/>                            |
| Show Data               | <input type="checkbox"/>                            |
| Exclude                 | <input type="checkbox"/>                            |
| Fix Direction           | <input type="checkbox"/>                            |
| Group                   | <input type="checkbox"/>                            |
| Fix Length              | <input type="checkbox"/>                            |
| Length (m)              | 4,152.1   |
| Gradient (%)            | 0.0   |
| Diffuser                | <input type="checkbox"/>                            |
| Resistance (Ns²/m8)     | 0.00011 (Auto)                                      |
| Resistance Type         | Auto  |
| Friction Factor (kg/m³) | 0.0120 (Auto)                                       |
| Shock X                 | 0.00 (Nil)  |
| Q (m³/s)                | 0.0   |
| V (m/s)                 | 0.0   |
| P Loss (Pa)             | 0.0   |
| R (Ns²/m8)              | 0.00011   |

# FUTURE INTEGRATION IMPROVEMENTS

The screenshot displays the Ventsim DESIGN 5.4 interface. The main window shows a 3D visualization of a mine airway system with various tunnels and shafts. A right-hand panel titled 'EDIT - 1 Airways, 87.3 m' provides detailed attributes for a selected airway. A green box highlights the 'Attributes' section of this panel.

| Attributes                                    |                |
|---|----------------|
| Resistance (Ns <sup>2</sup> /m <sup>8</sup> ) | 0.00153 (Auto) |
| Resistance Type                               | Auto           |
| Friction Factor (kg/m <sup>2</sup> )          | 0.0050 (Auto)  |
| Shock X                                       | 0.00 (Nil)     |

Other visible attributes in the panel include:

- Airway:** Name: Main(-720)...FAR|1, Index Number: 4644, Unique Number: 4659
- Size:** Tunnel Type: Vertical Vent, Airway Shape: Round, Diameter (m): 4.50, Area (m<sup>2</sup>): 15.9, Obstruct (m<sup>2</sup>): 0.0, Rotation (°): 0.0, Backfill (%): 0.0, Parallel Airways: 1
- Layers:** Air Type: Fresh, Primary Layer: FAR, Secondary Layer: Oreaccess
- Options:** Surface: , Close End: , Show Data: , Exclude: , Fix Direction: , Group: , Fix Length: , Length (m): 87.3, Gradient (%): Up
- Simulation:** Q (m<sup>3</sup>/s): 0.0, V (m/s): 0.0, P Loss (Pa): 0.0, R (Ns<sup>2</sup>/m<sup>8</sup>): 0.00153



# FUTURE INTEGRATION ENHANCEMENTS

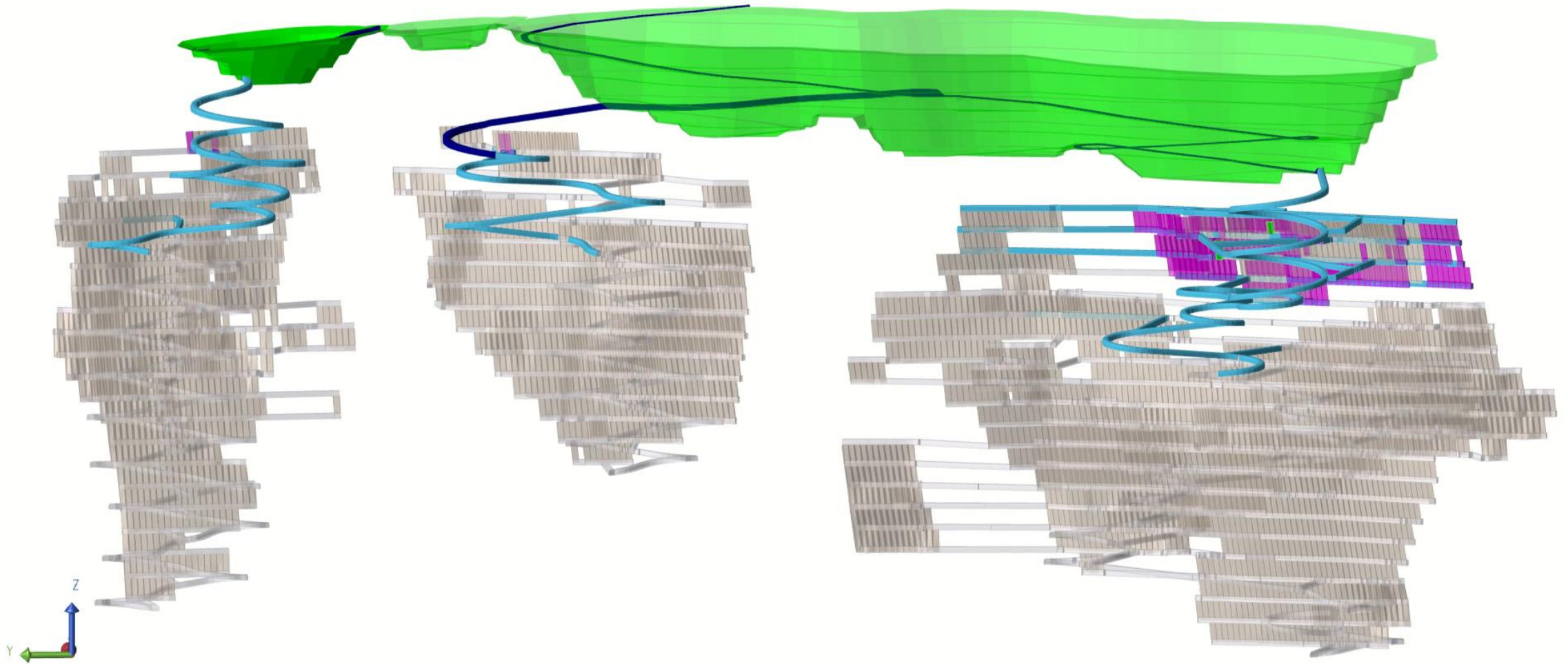
## RPM | MINEPLANNER



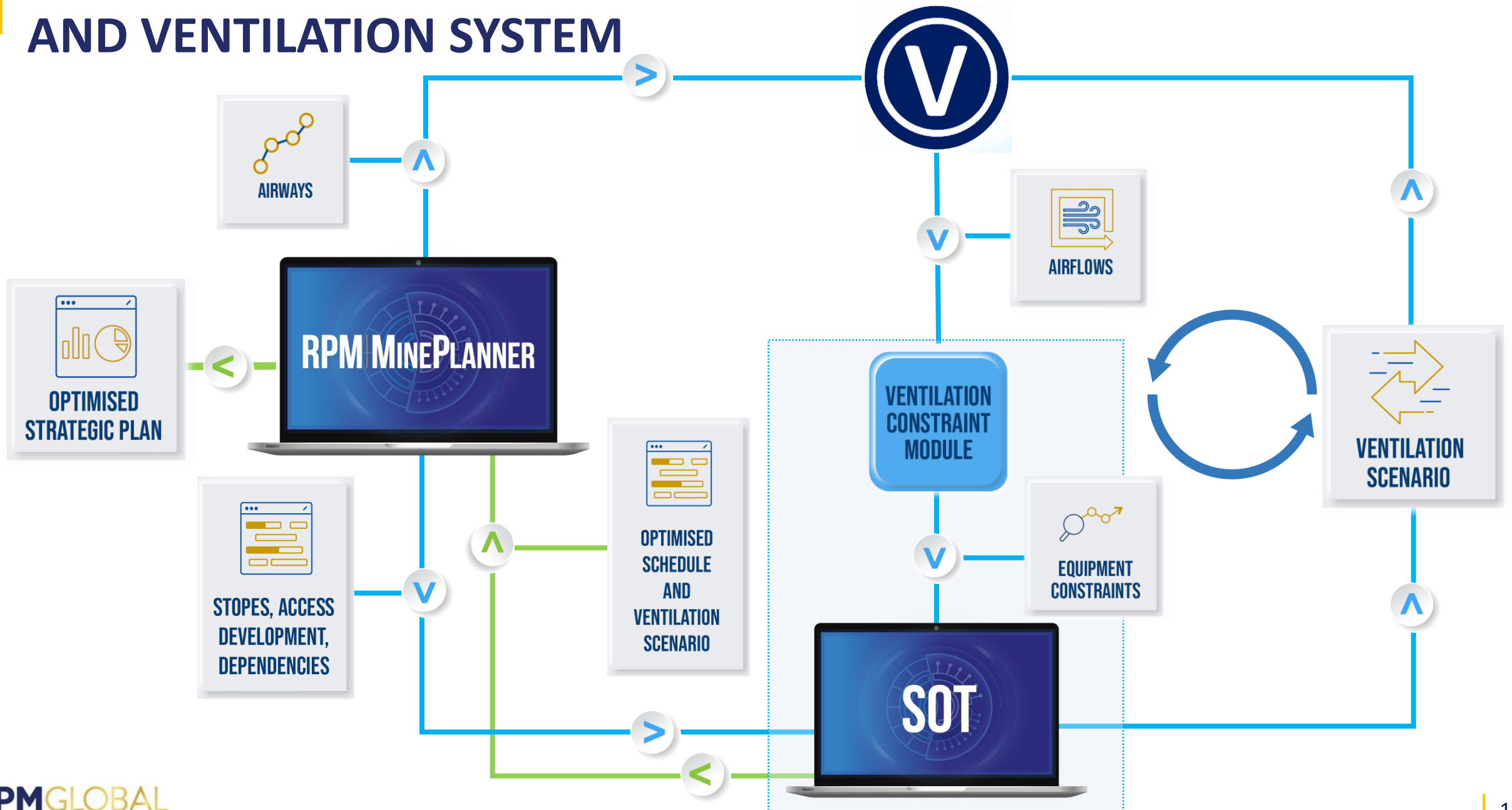
- Automatically identify location of air crossings, underpasses and stoppings from design
- Schedule updates
- Share via API:
  - Orebody solids, topographies
  - Global reference data

- ✓ Share locations via API
- ✓ Adjust staging without modifying components of the schedule
- ✓ Share via API:
  - Reference files
  - Populate settings and attribute fields

# NPV OPTIMISATION OF LOM SCHEDULE



# SIMULTANEOUS OPTIMISATION OF LOM SCHEDULE AND VENTILATION SYSTEM





# RPMGLOBAL

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