



Introduction to Ventsim CONTROL

September 27th, 2023



Revolving Around You™

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Newmont Eleonore Mine

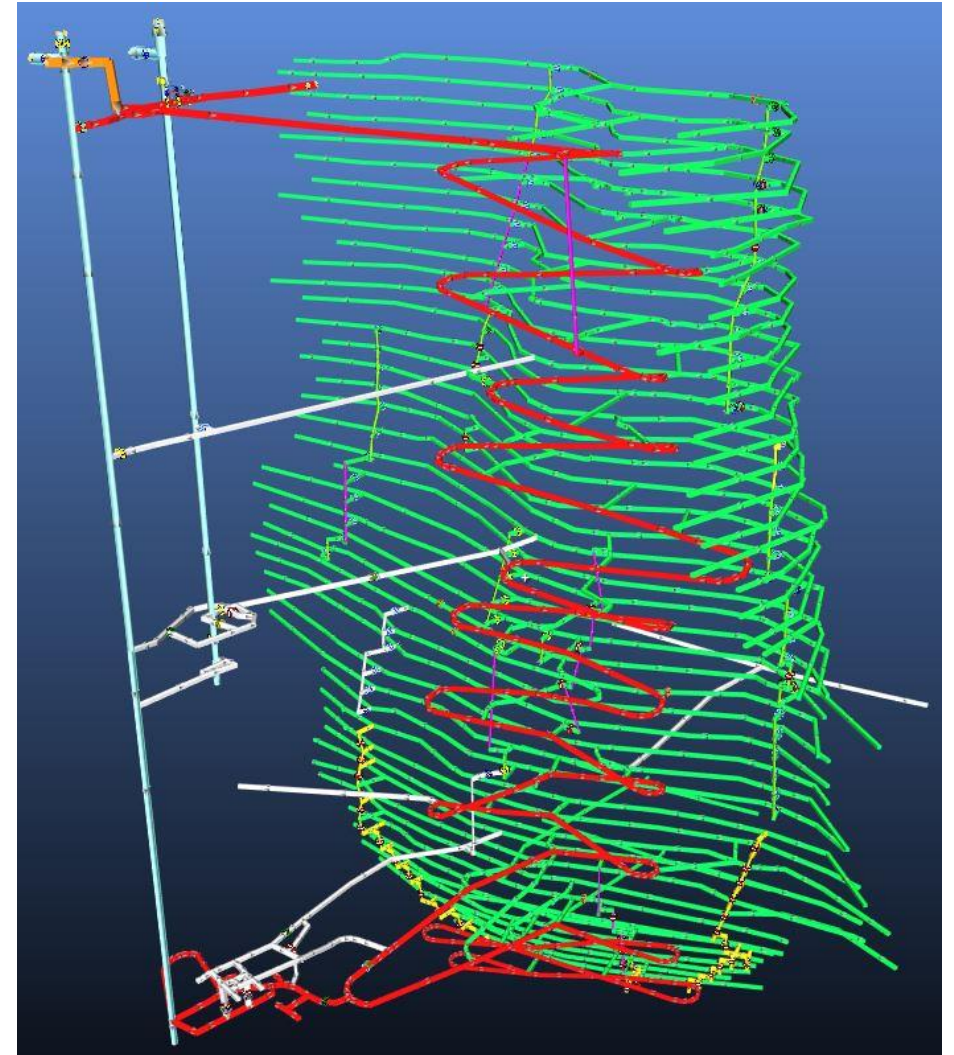
Timeline

- **2011: Initial partnership & engineering studies at the beginning of the mine**
- **2014: Ventsim CONTROL system installation & operation**
- **2019: Quebec government awards the Eureka prize to Eleonore for innovation**



Highpoints

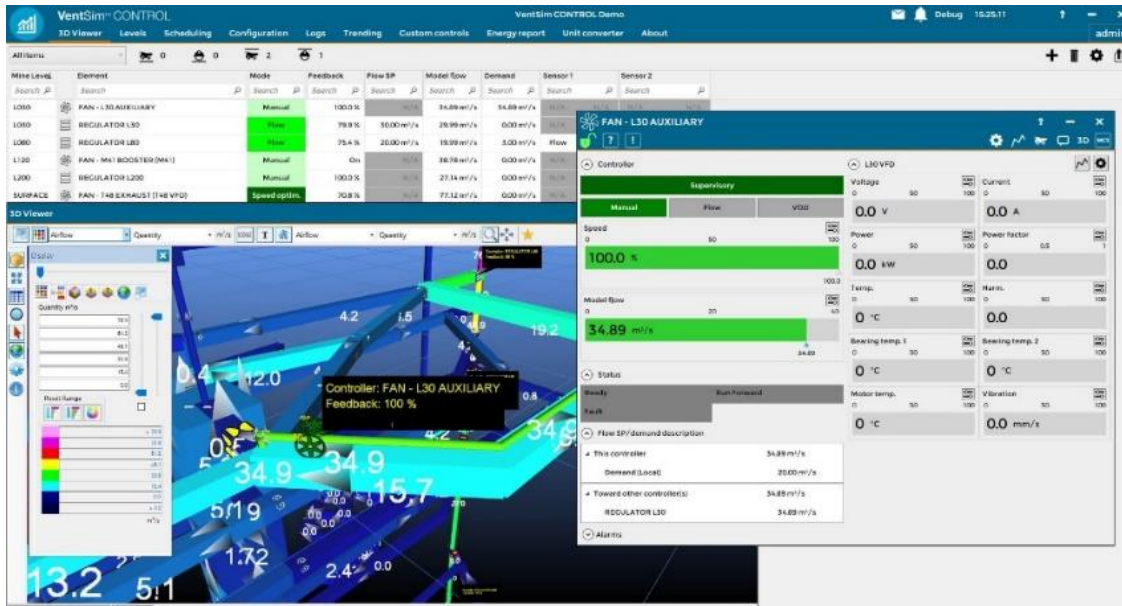
- One of the most advanced mines in the world
- 6 Surface Primary Fans (5,700 HP total)
- 300 Underground Fans (26,500 HP total)
- 48 Automated Airflow Louvers
- Advanced Control Modes:
 - VOD
 - Total Demand
 - Speed Optimizer
 - Custom Control Algorithms
- Average Energy Savings of \$7.5M CAD/year
(0.05 \$CAD/kWh)



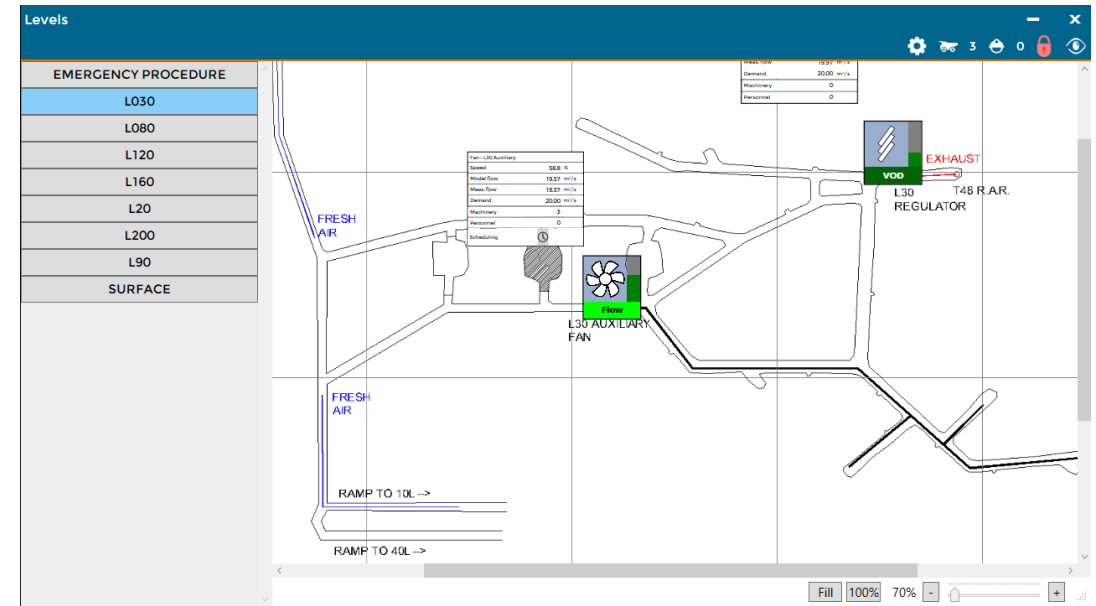
What have we brought over from Ventsim™ DESIGN?

What have we brought over from Ventsim™ DESIGN?

3D Viewer



Visualize, monitor and control from the 3D Viewer

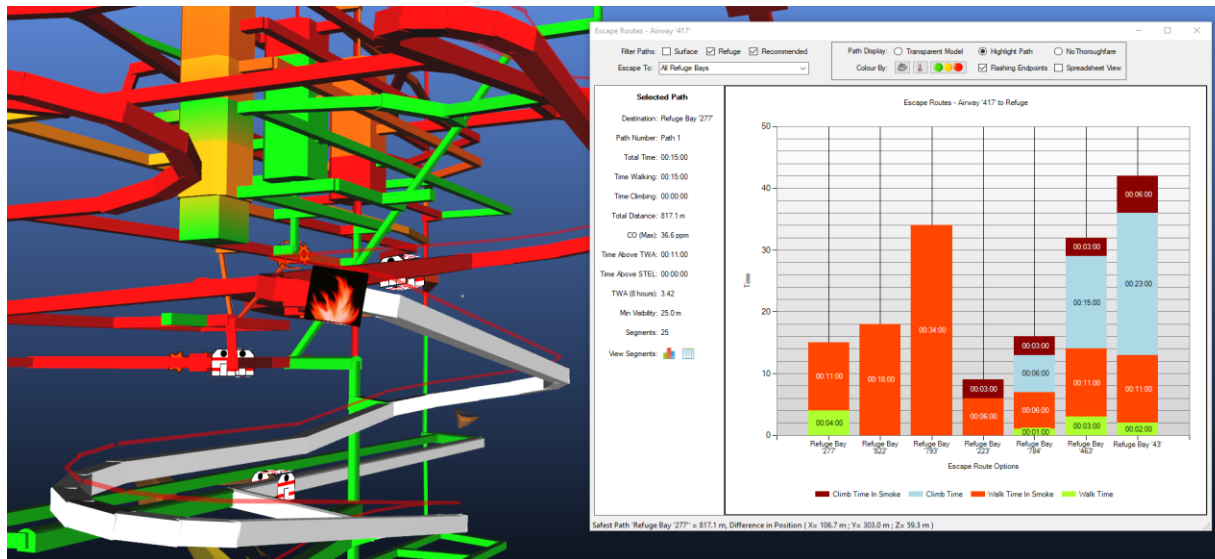


Traditional way of visualizing through level plans

What have we brought over from Ventsim™ DESIGN?

Fire simulation

- Create an instant snapshot of your mine
- Allows for a faster set up of an emergency scenario
- Evaluate emergency routes to exit or to plan a response.

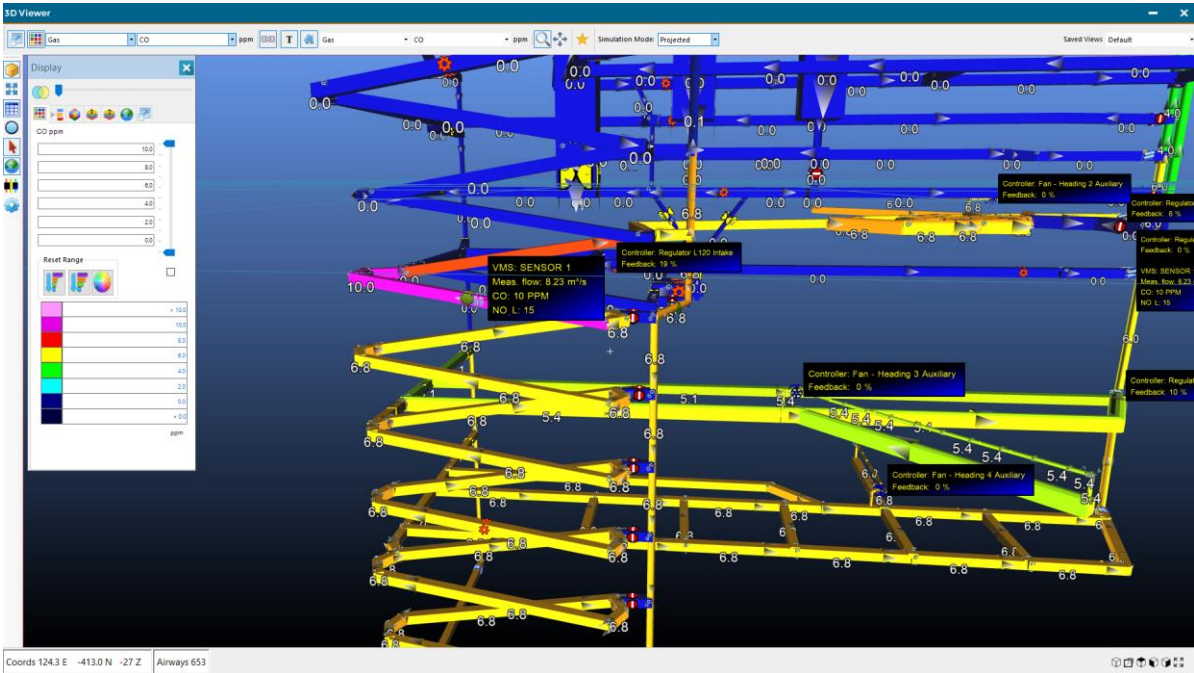


What have we brought over from Ventsim™ DESIGN?

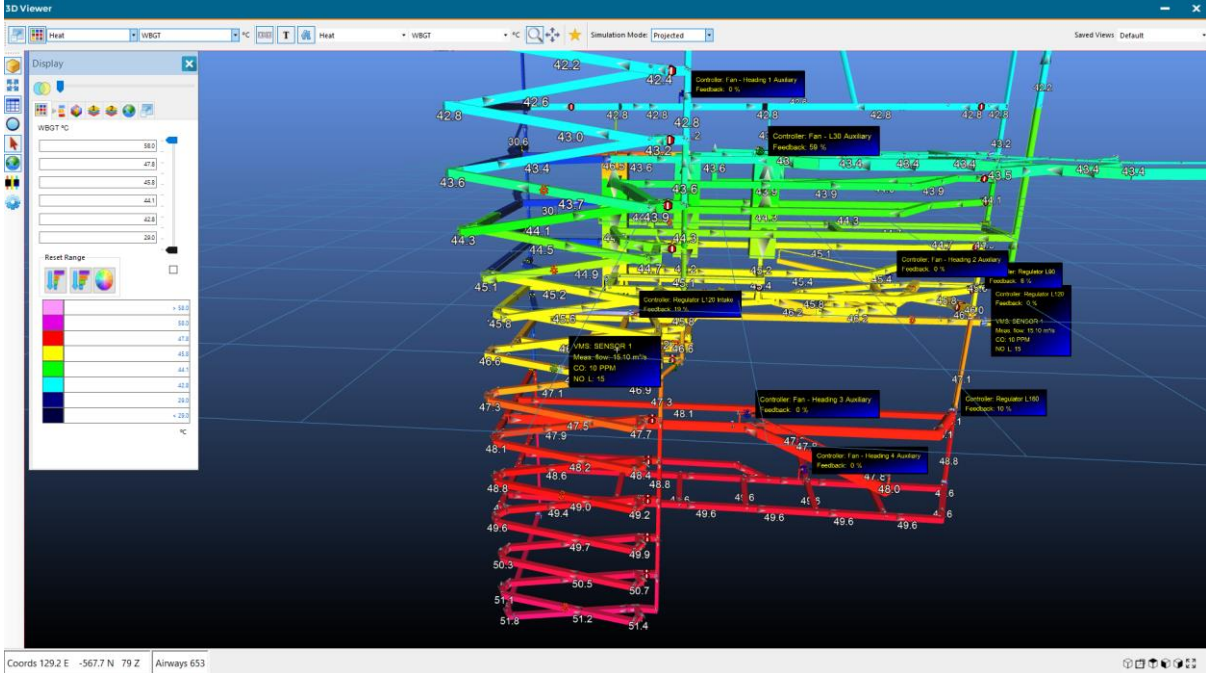
Dynamic gas and heat simulation



Projected dynamic gas simulation

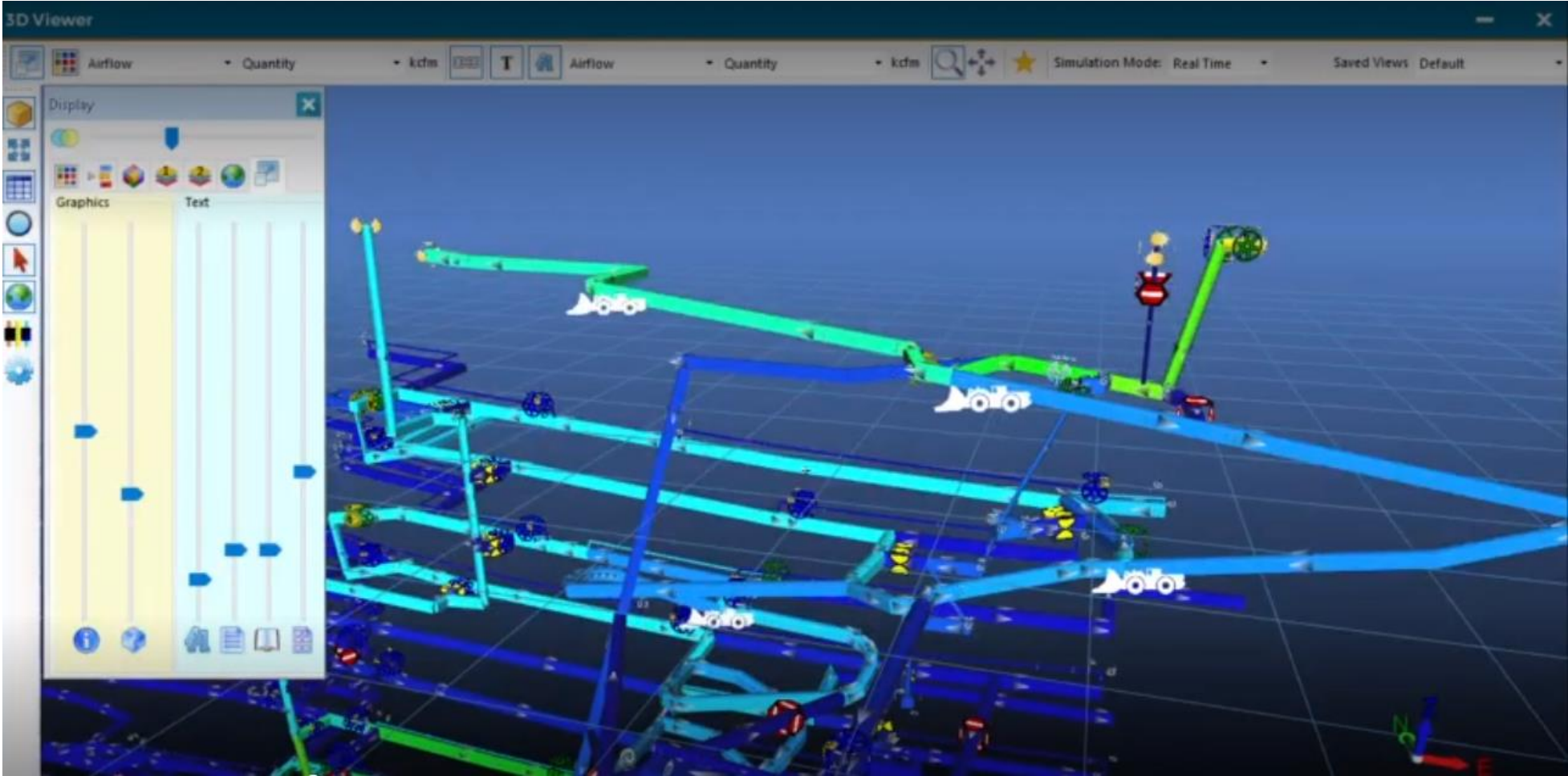


Projected dynamic heat simulation



What have we brought over from Ventsim™ DESIGN?

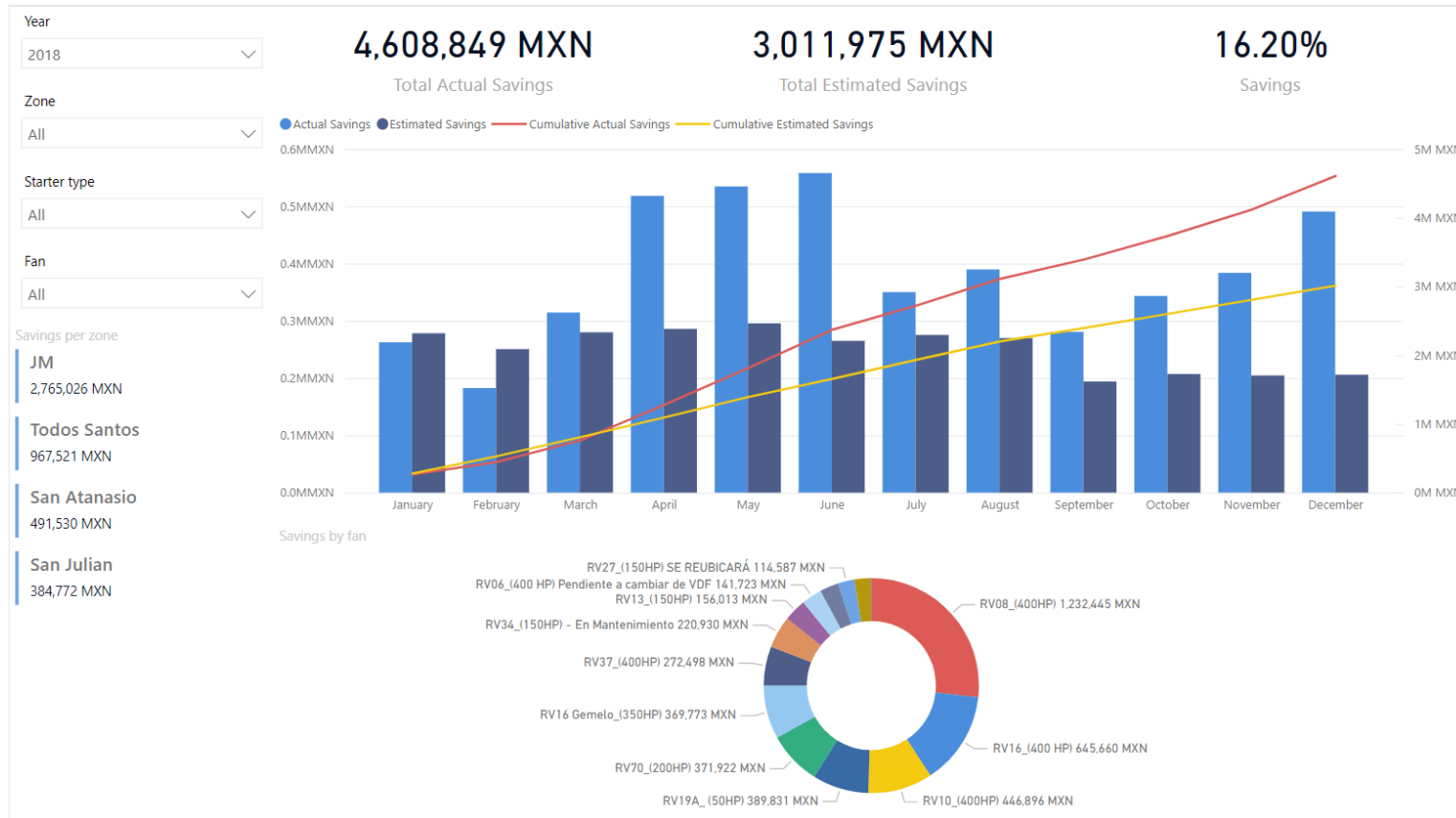
Tracking in the 3D



Upcoming Features

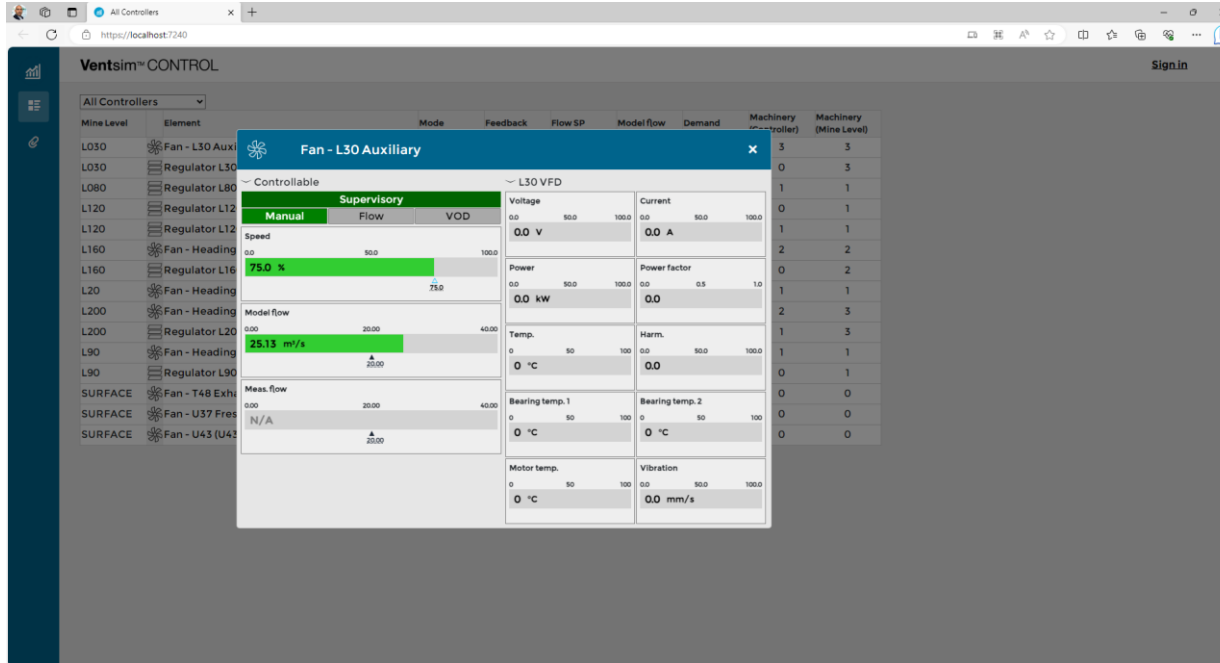
Upcoming Features

Integration of Business Intellegent Reports



Upcoming Features

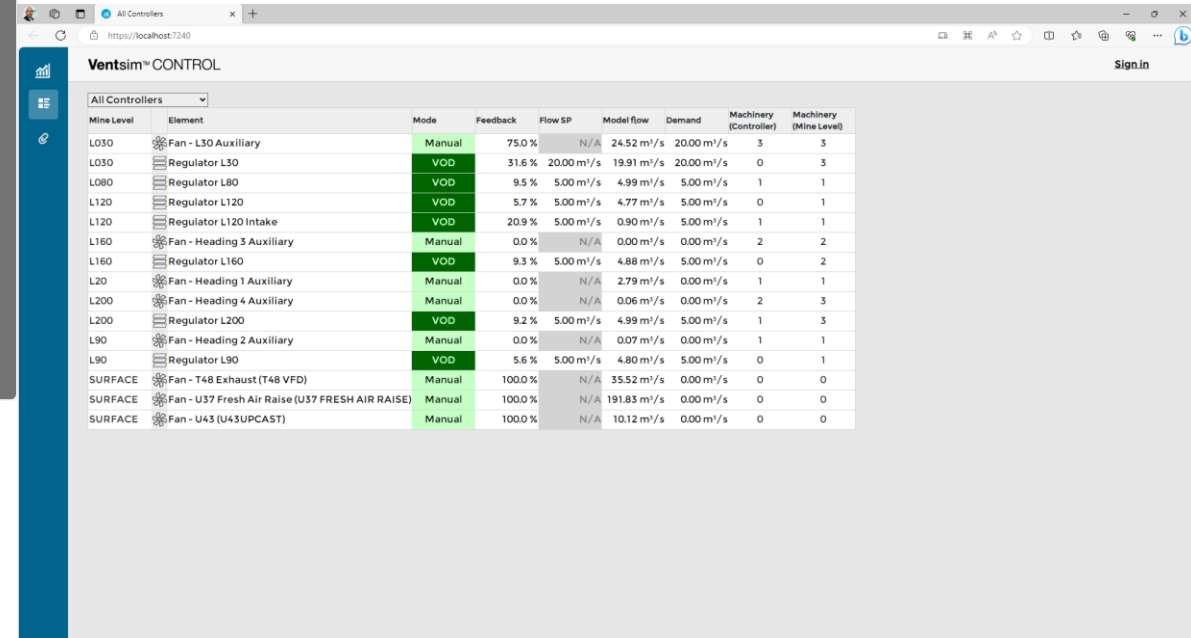
Web Application



The screenshot shows the Ventsim CONTROL web application interface. A modal window titled "Fan - L30 Auxiliary" is open, displaying detailed data for the L30 VFD. The modal includes a "Supervisory" control mode and various real-time metrics:

- Speed:** 75.0 % (indicated by a green progress bar)
- Model flow:** 25.13 m³/s (indicated by a green progress bar)
- Voltage:** 0.0 V
- Current:** 0.0 A
- Power:** 0.0 kW
- Power factor:** 0.0
- Temp.:** 0 °C
- Harm.:** 0.0
- Bearing temp. 1:** 0 °C
- Bearing temp. 2:** 0 °C
- Motor temp.:** 0 °C
- Vibration:** 0.0 mm/s

The background shows a table of all controllers with columns for Mine Level, Element, Mode, Feedback, Flow SP, Model flow, Demand, Machinery (Controller), and Machinery (Mine Level).



The screenshot shows the Ventsim CONTROL web application interface displaying a summary table of all controllers. The table includes columns for Mine Level, Element, Mode, Feedback, Flow SP, Model flow, Demand, Machinery (Controller), and Machinery (Mine Level).

Mine Level	Element	Mode	Feedback	Flow SP	Model flow	Demand	Machinery (Controller)	Machinery (Mine Level)
L030	Fan - L30 Auxiliary	Manual	75.0 %	N/A	24.52 m ³ /s	20.00 m ³ /s	3	3
L030	Regulator L30	VOD	31.6 %	20.00 m ³ /s	19.91 m ³ /s	20.00 m ³ /s	0	3
L080	Regulator L80	VOD	9.5 %	5.00 m ³ /s	4.99 m ³ /s	5.00 m ³ /s	1	1
L120	Regulator L120	VOD	5.7 %	5.00 m ³ /s	4.77 m ³ /s	5.00 m ³ /s	0	1
L120	Regulator L120 Intake	VOD	20.9 %	5.00 m ³ /s	0.90 m ³ /s	5.00 m ³ /s	1	1
L160	Fan - Heading 3 Auxiliary	Manual	0.0 %	N/A	0.00 m ³ /s	0.00 m ³ /s	2	2
L160	Regulator L160	VOD	9.3 %	5.00 m ³ /s	4.88 m ³ /s	5.00 m ³ /s	0	2
L20	Fan - Heading 1 Auxiliary	Manual	0.0 %	N/A	2.79 m ³ /s	0.00 m ³ /s	1	1
L200	Fan - Heading 4 Auxiliary	Manual	0.0 %	N/A	0.06 m ³ /s	0.00 m ³ /s	2	3
L200	Regulator L200	VOD	9.2 %	5.00 m ³ /s	4.99 m ³ /s	5.00 m ³ /s	1	3
L90	Fan - Heading 2 Auxiliary	Manual	0.0 %	N/A	0.07 m ³ /s	0.00 m ³ /s	1	1
L90	Regulator L90	VOD	5.6 %	5.00 m ³ /s	4.80 m ³ /s	5.00 m ³ /s	0	1
SURFACE	Fan - T48 Exhaust (T48 VFD)	Manual	100.0 %	N/A	35.52 m ³ /s	0.00 m ³ /s	0	0
SURFACE	Fan - U37 Fresh Air Raise (U37 FRESH AIR RAISE)	Manual	100.0 %	N/A	191.83 m ³ /s	0.00 m ³ /s	0	0
SURFACE	Fan - U43 (U43UPCAST)	Manual	100.0 %	N/A	10.12 m ³ /s	0.00 m ³ /s	0	0

Upcoming Features

Temperature Prediction

Ventsim™ CONTROL

3D Viewer Safety Levels Scheduling Configuration Logs Trending Custom controls

Cooling on Demand 0 0 10 0

Mine Level	Element	Mode	Feedback	Model flow	Flow SP	Demand
L0 - SURFACE	L0 - Surface BAC	Optimization				
L0 - SURFACE	L0 - Surface - Collar VMS			98.61 m ³ /s		0.00 m ³ /s
L0250	L0250 - FAR Regulator	VOD	76.7 %	40.26 m ³ /s	40.00 m ³ /s	40.00 m ³ /s
L0250	L0250 - FA VMS			40.26 m ³ /s		0.00 m ³ /s

L0 - Surface BAC

Controller

Supervisory

Off Setpoint Optimization

Supply temperature 0 50 100

21.04 °C

21.04

Remote temperature 0 50 100

22.00 °C

22.00

Temperature optimization

Manual supply temperature SP 20.00 °C

Temperature bias 1.04 °C

Actual supply temperature SP 21.04 °C

Alarms

L0 - Surface - Collar VMS

Wet-bulb temperature 0 15 30

21.0 °C

L0250 - FA VMS

Wet-bulb temperature 0 15 30

22.0 °C





Thank you

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