

A large yellow autonomous haul truck is shown in an open-pit mine. The truck is positioned in the center of the frame, facing forward. It has a large, rounded roof and a prominent front grille. The background shows a deep, rocky pit with a forest of tall trees in the distance. The lighting is bright, suggesting daytime.

***Recent Experiences with Autonomous  
Haul Trucks in Open Pit Mines***

**Presented by  
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# ***Introduction***

- *History of Autonomous Trucks*
- *Vehicle Control - Drive and Navigation*
- ***Supervisory Control - Optimization***
- ***Demonstrations***



# ***Vehicle Control***



# Major Components of Unmanned Mining Trucks



# Vehicle Navigation System



# ***The Result !***



***Haul Road***

# ***Supervisory Control***



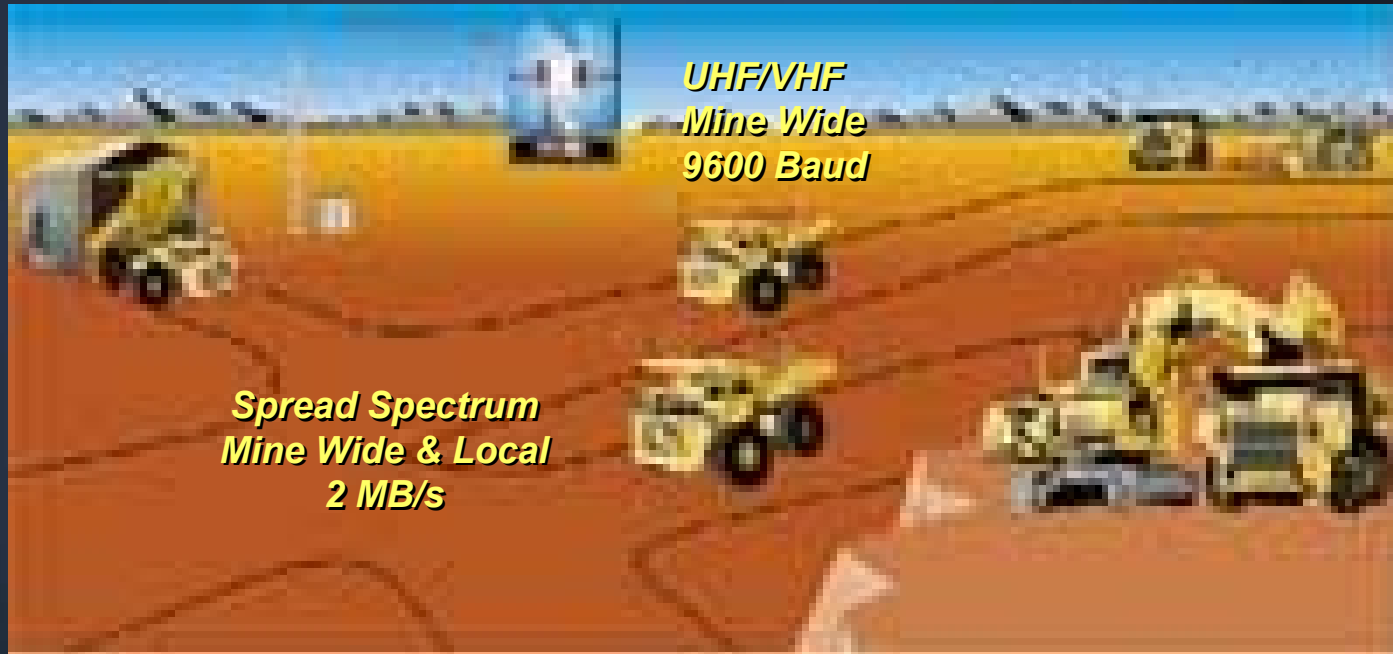
***Control Room***





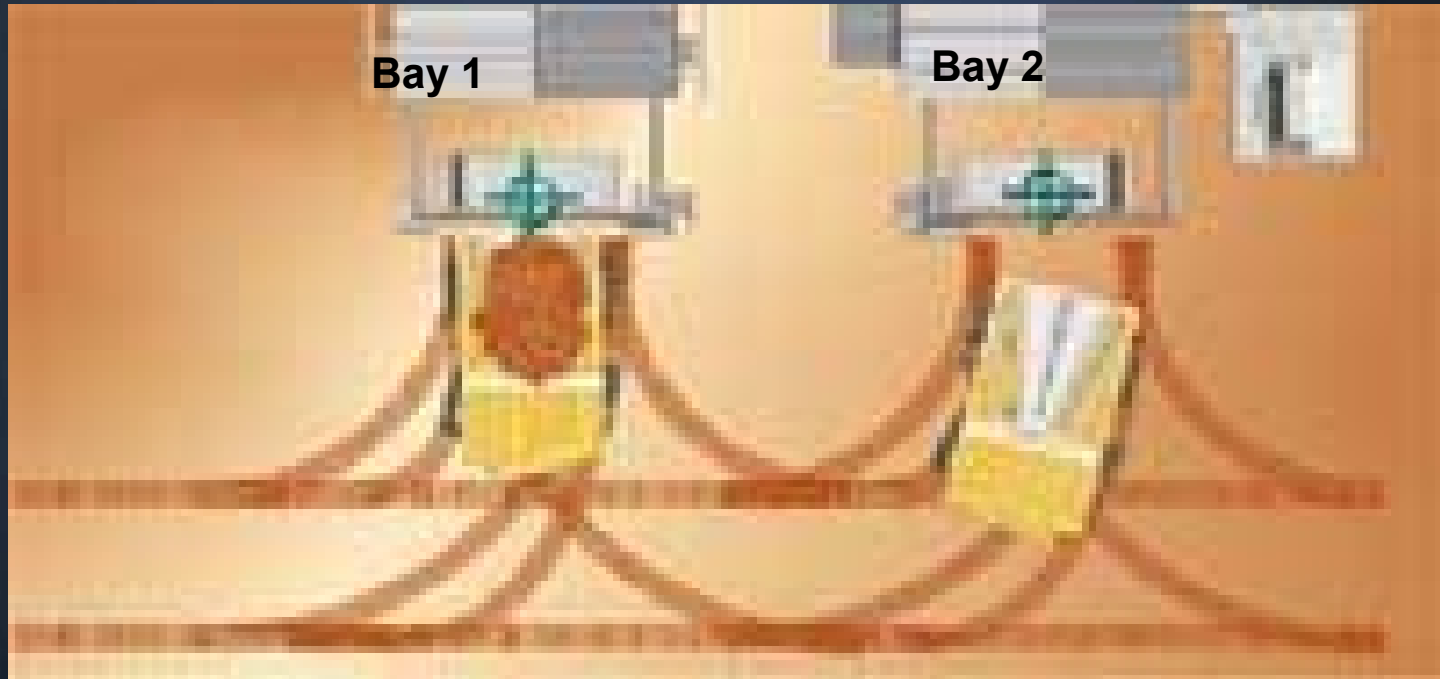
# *Pit Patroller*





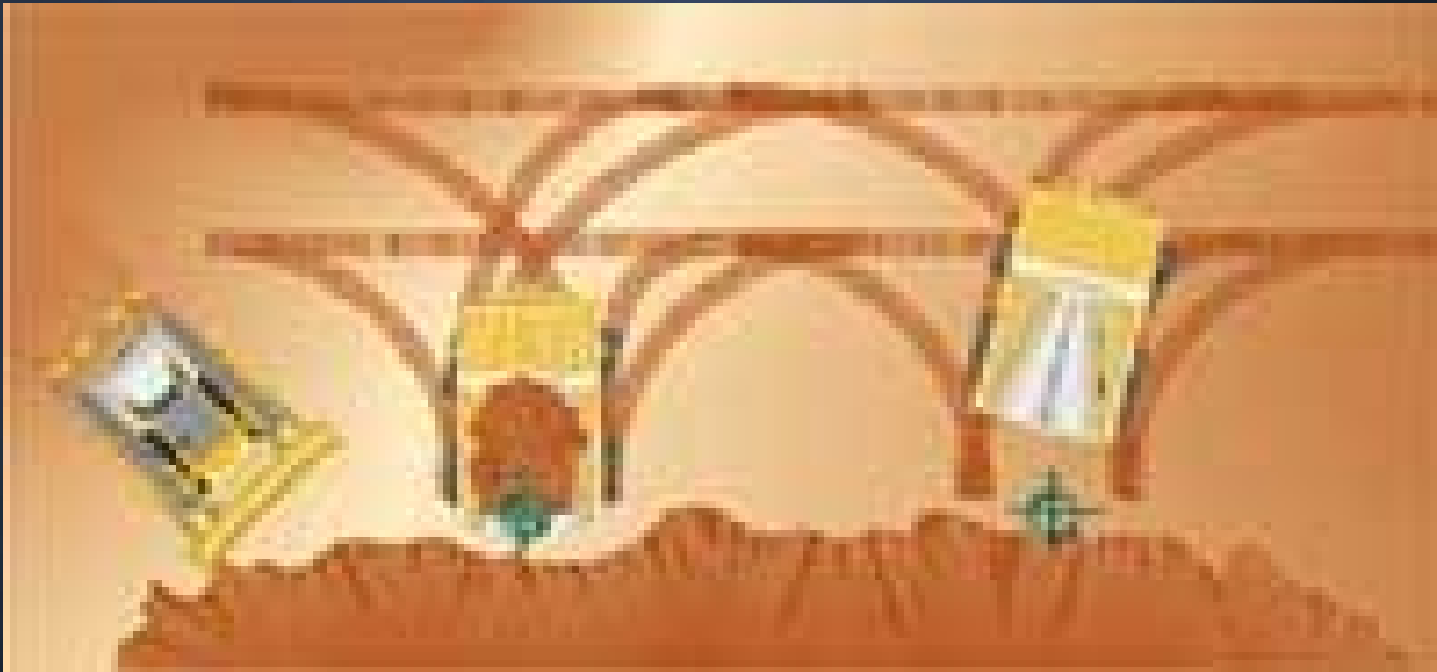
**Communications Network**  
**“Open Systems” Standards**

# ***Autonomous Haulage System***



***Dumping at Crushers***

# ***Autonomous Haulage System***



***Dumping at Stockpiles/Waste Dumps***

# ***The Results !***



# ***Autonomous Haulage System***



***Truck Back-up Strategies***

# ***Autonomous Haulage System***



***Top Loading***

# ***The Introduction of Autonomous Trucks***



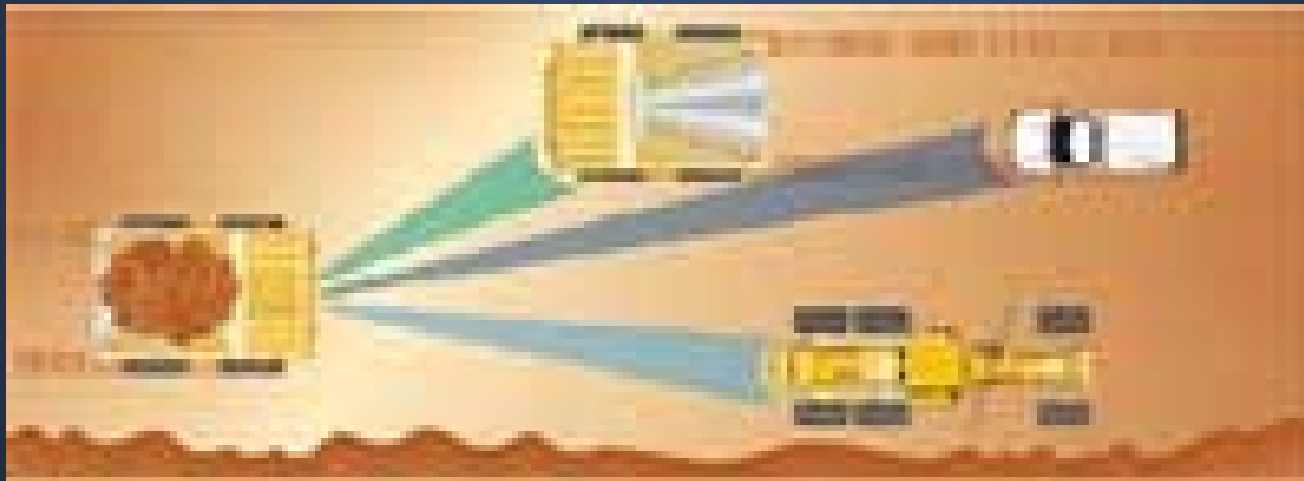


# ***Safety & Adaptability***



***Obstacle Detection Systems***

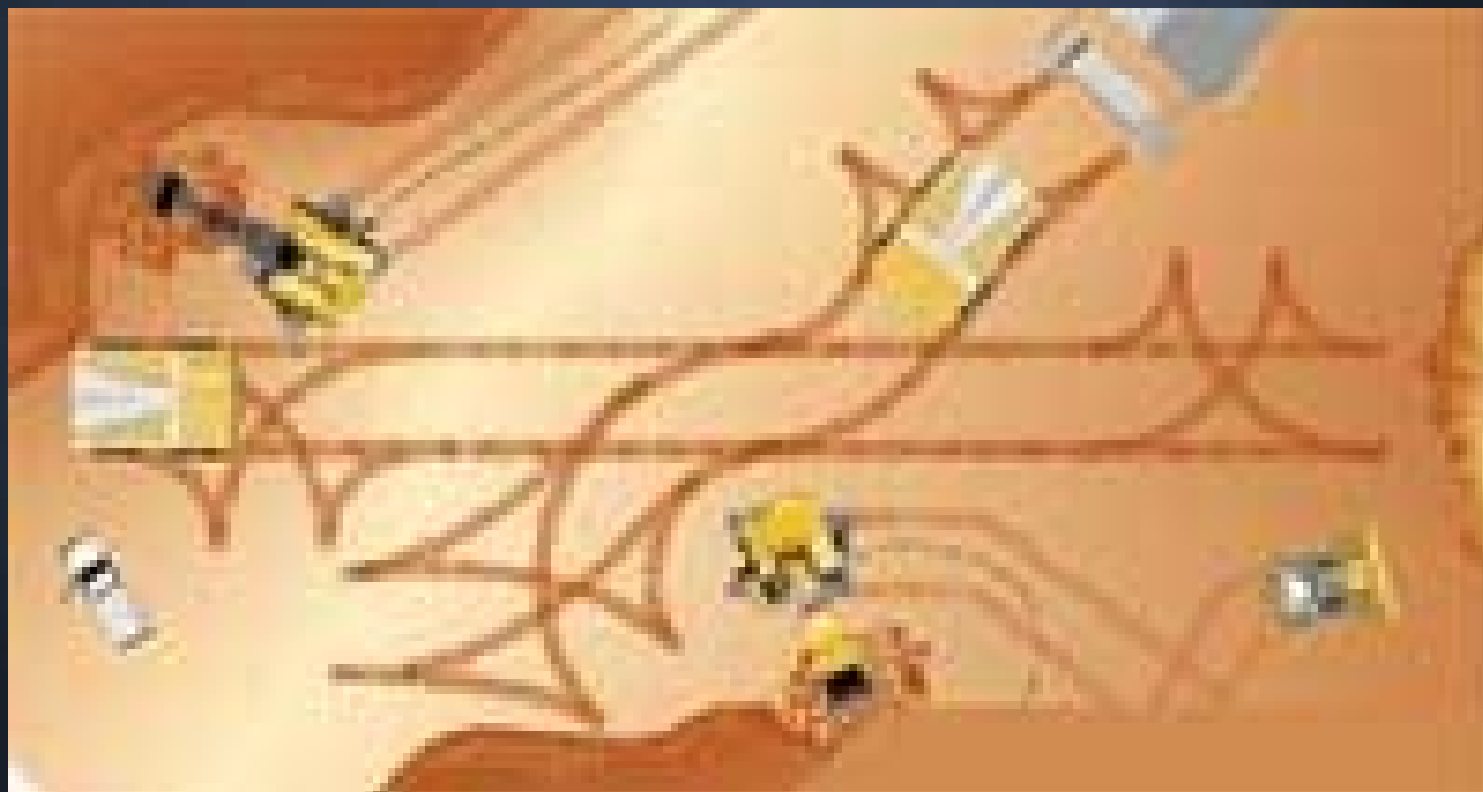
# ***Safety & Adaptability***



## ***Vehicle Detection***

- ***Proximity Communications***
- ***Obstacle Detection***

# ***The Result !***



# ***Demonstrations***



***Obstacle Detection Systems***











# ***System Benefits***

- *Improved Material Flow Control*
  - **Improved Blending**
  - **Positive Material Destination Control**
- *Improved Fleet Availability*
  - **Improved Fleet Monitoring**
  - **Reduced Wear and Tear**
    - » **Improved Fuel Efficiency**
    - » **Predictable Component Wear**
- *Improved Use of Availability*
  - **Significant Reduction in Break Times**
- *Improved Fleet Control (Dispatching)*
  - **Events Happen When Expected**
- *Improved Mine Safety*
  - **No Operator Stress**
  - **Minimal Manned Interaction**

**Thank You!**

