



AngloAmerican



HEXAGON

# Intelligent Mining Solutions

The Advantage of Smart Technology.



Introduction to the project.

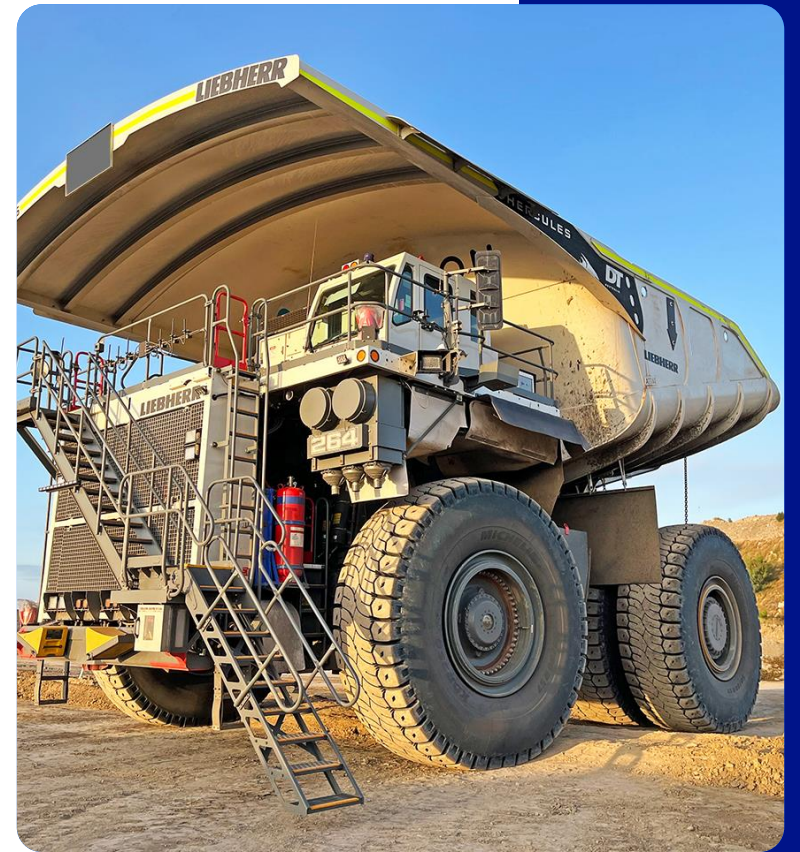
# RCT, Anglo American, and Hexagon - a relationship built on expertise, innovation and trust.

As a group, this was the first time we have had a partnership, with everyone learning together

The project was in support of Anglo-American achieving its business goals of changing the way mining is performed for a more productive, safe, and sustainable future.

RCT and Hexagon implemented their technical expertise and cutting-edge products on Australia's largest Level 9 Collision Avoidance System-Vehicle Intervention System (CAS-VIS) implementation.

This was at the Capcoal and Dawson surface coal mines in Queensland which saw CAS-VIS Level 9 system successfully deployed.

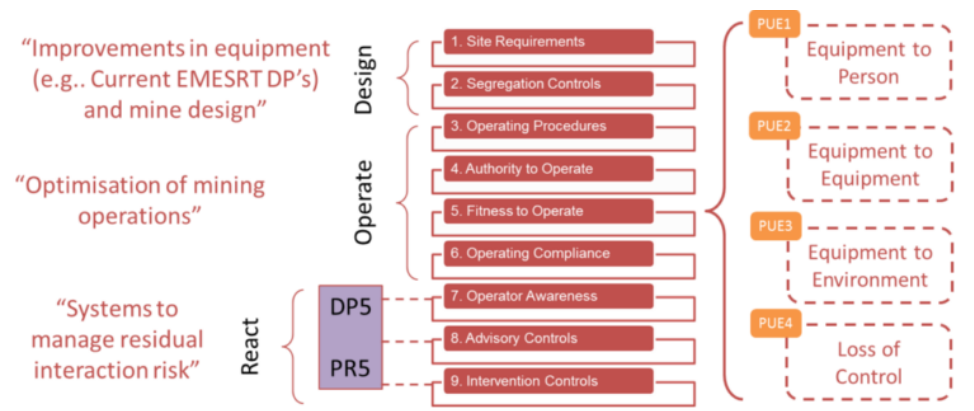




Market situation – Anglo American

# Despite years of effort to address safety issues, the question remains—why do accidents keep occurring?

- Mining equipment is great, but they offer poor external vision and limited manoeuvrability for operators.
- Currently the only protection against collisions on most sites is procedural.
- Majority of collisions occur in open cut because there are moving and stationary objects.
- Due to the size of the vehicle, even if the heavy vehicle driver could have unrestricted 360-degree vision around the vehicle, this would still not be sufficient.
- EMESRT Nine Layer Control Effectiveness Model was created to reframe our understanding of Vehicle Interaction Controls and better improve on the above.



## Background – AngloAmerican

# Avoid the risk of collisions between site personnel, other machines, and site infrastructure

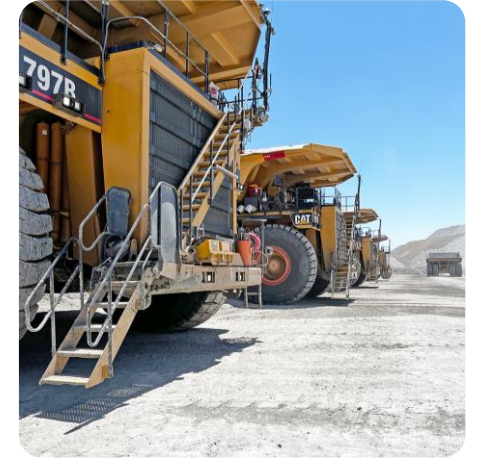
- There were two High Potential Incidents involving haul trucks and dozers at Dawson Mine in 2019.
- In open-cut mines, vehicle interactions pose the greatest threat to worker safety.
- FutureSmartMining™ aims to reduce risk exposure for people by introducing engineering controls to prevent incidents from happening in the first place.
- An engineering control called a collision avoidance system (CAS) has the potential to greatly lower the likelihood of collisions at AA sites. Our open-cut mines already employ this technology.
- A level 7 CAS that is currently in use by AA is being phased out by the vendor.



Creating a solution – AngloAmerican

## CAS-VIS Level 9 supports Operators to complete their work safely reducing vehicle-to-vehicle interactions across site.

- Australian first for CAS-VIS technology by vendor Hexagon who have implemented CAS-VIS in Anglo South Africa
- First-time vendors - RCT and Hexagon – have partnered. Everyone learning together
- 3 different truck types (6 models) with different designs – where to locate new system parts has been a learning for all.
- 2 simultaneous site deployments – Capcoal and Dawson.
- 119 trucks to install and commission • ~1000 CMWs to train (including contractors)
- CAS –VIS Level 9 brings Anglo up to the Global standards of Earth Moving Equipment Safety across our sites.
- MIC design and bench testing with CAS system RCT Factory, then installation and commissioning hardware on each truck Dawson and Capcoal Mines.
- Minimum of 250hrs of trials in the field for each truck type.
- Dawson Go-Live in April 2022.
- Capcoal Go-Live in July 2022.





Creating a solution – Hexagon Mining

## CAS – VIS L9 Features.

- 1. Launch Assist (LA):**  
Inhibit vehicle propulsion at start-up (vehicle static) if a threat is identified
- 2. Asset Protect (AP):**  
Inhibit hoist and/ or propulsion in a delimited area
- 3. Speed Assist (SA):**  
Slow down the vehicle if speed is above the maximum
- 4. Ramp Assist (RA):**  
Activation of retarder on ramps to prevent over speeding
- 5. Tailgating Protect (TP):**  
Enforcing safety distance with the preceding vehicle, by inhibiting propulsion or retarder application
- 6. Brake Assist (BA):**  
Activation of the service brakes to mitigate imminent collision with a vehicle if speed is 10 km/h or less
- 7. Progressive Brake Assist (PBA):**  
Activation of the retarder to mitigate collision with static vehicle or geo-fenced obstacles.



## Creating a solution – Hexagon Mining

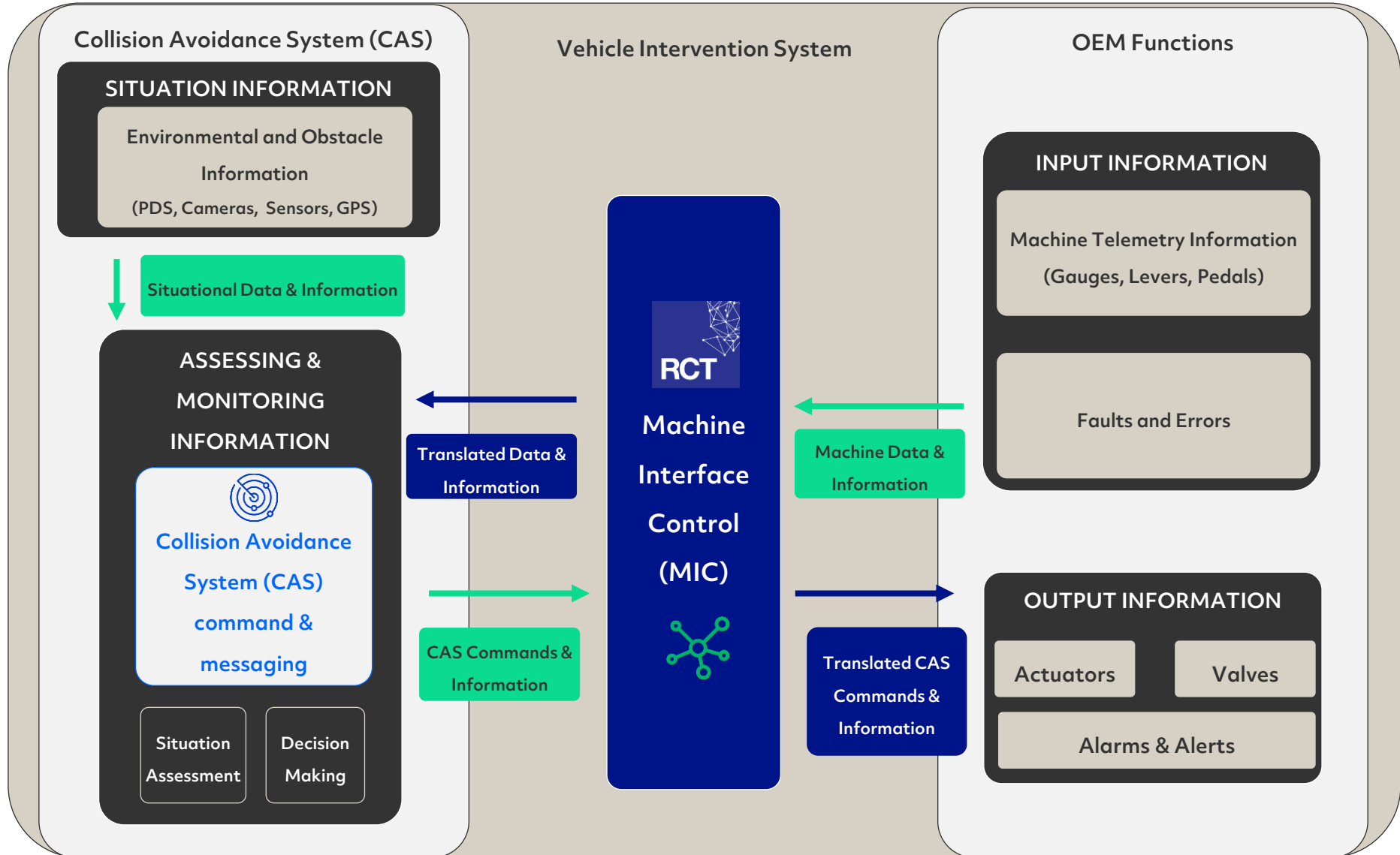
# CAS

- Two distinct separate systems in one
  - Proximity L7 advice by Close, Near and Far zones
  - Predicted collision alarm L8 by the intersection of projected dynamic paths and time to impact.
- Easy upgrade to CAS – VIS
  - Add 4D radar and implement a MIC
  - CAS-VIS since 2018 across 3 Continents, 8 mines and 500+ Haul Trucks
- Fully configurable to suppress alarms in Truck Digger Dozer interactions for driver comfort
- CAS analytics for trends and investigations
- Integrates with Hexagon Fatigue and FMS Sol's
- Many features with Speed warnings, Controls with Georeferenced zones, Gate control, Visitors
- Simple 2 component design that is backwards compatible with previous versions.
- 40,000 CAS, 6000 Fatigue in over 100+ mines
- Local support in Newcastle, Brisbane and Perth



How does it work?

# Machine Interface Control

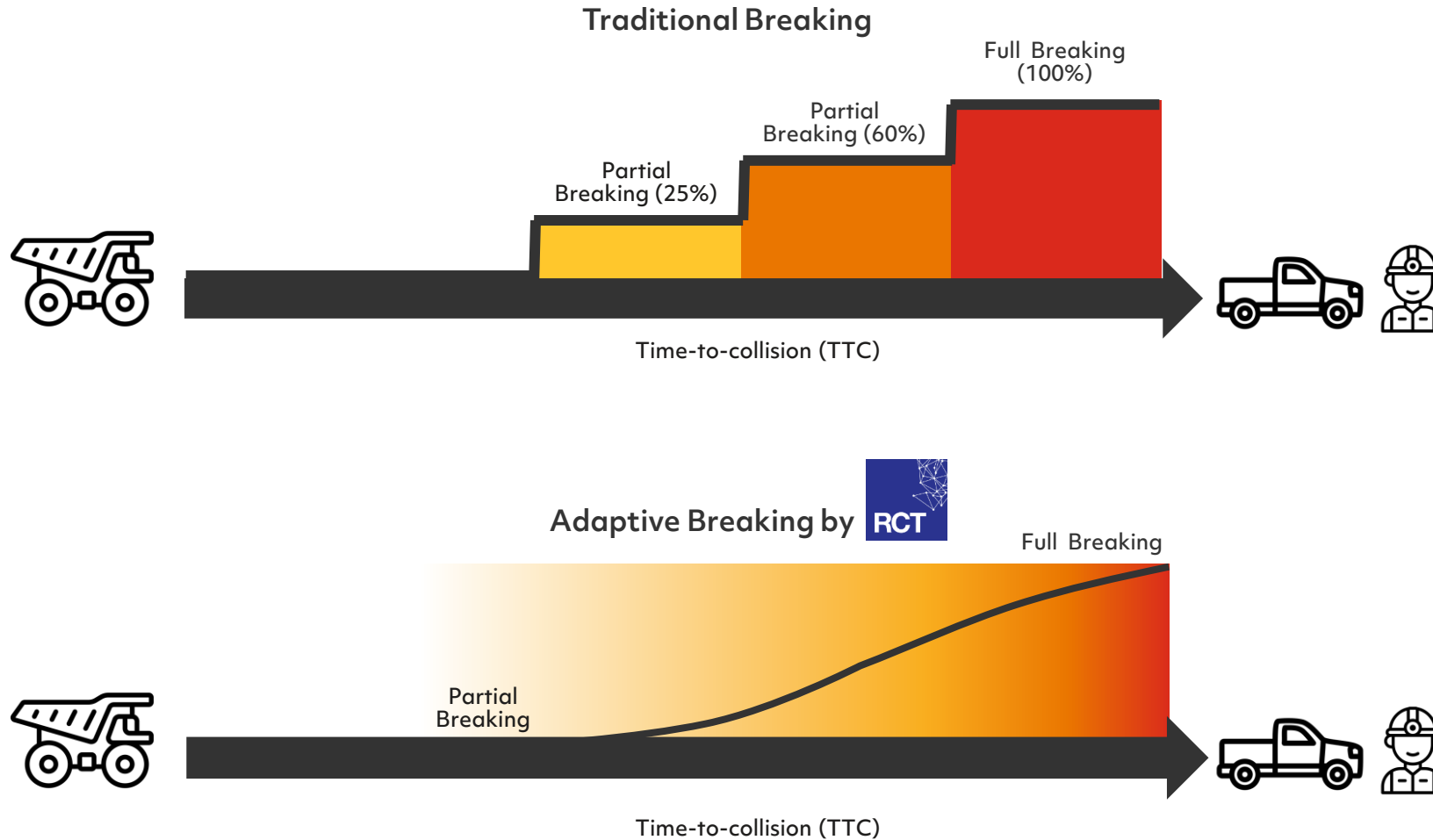






# What does RCT offer customers differently

Below is an example of the competition vs RCT MIC braking.



## Key findings and limitations

# What worked and what didn't?

Workforce actively involved in the implementation – key operators assigned to the project for field trials, testing and feedback (SSHR involvement at both sites)

Feedback process was extended to all operators and impacted CMWs

Hands-on practical training was a key to change and training approach – including instructions videos

The message is that Australia's first implementation of CAS Level 9 was a success in a short timeline through a collaborative 3-way effort.

Integrated Change Management Approach following PROSCI's ADKAR model throughout the project milestones.

Review and adjustment of CAS level 7 and 8 system deployment (phase 1) to improve operator experience.

Extensive communication and mandatory training (theory knowledge assessment and practical component) for all vehicle operators and maintenance crews.

Creation of 'explainer' videos to use in training and communications (refer example on slide 3)

Change readiness assessments.

Hypercare period with onsite technical vendor coaching support to support further knowledge transfer and embedding following go-live.





# What's coming next?

## Hexagon 2023 – 2024:

- Series of CAS10 FW releases to:
- Approve Pedestrian Alert tags
- Approve smart '4D' discriminating radar for untagged object and person detections
- Approve improved CAS10 Analytics reporting with BI options I.e, Tableau
- Approve improved VIS features
- Approve further integration of HW and SW between FMS, Fatigue and CAS Solutions to realise Power of One objectives.

### Power of One Hardware Convergence – Future State

Scalable, modularized and simplified distributed computing on-board platform.

#### Positioning

- Smart Antenna capable of CAS, Connectivity and RTK Positioning

#### Core Processing

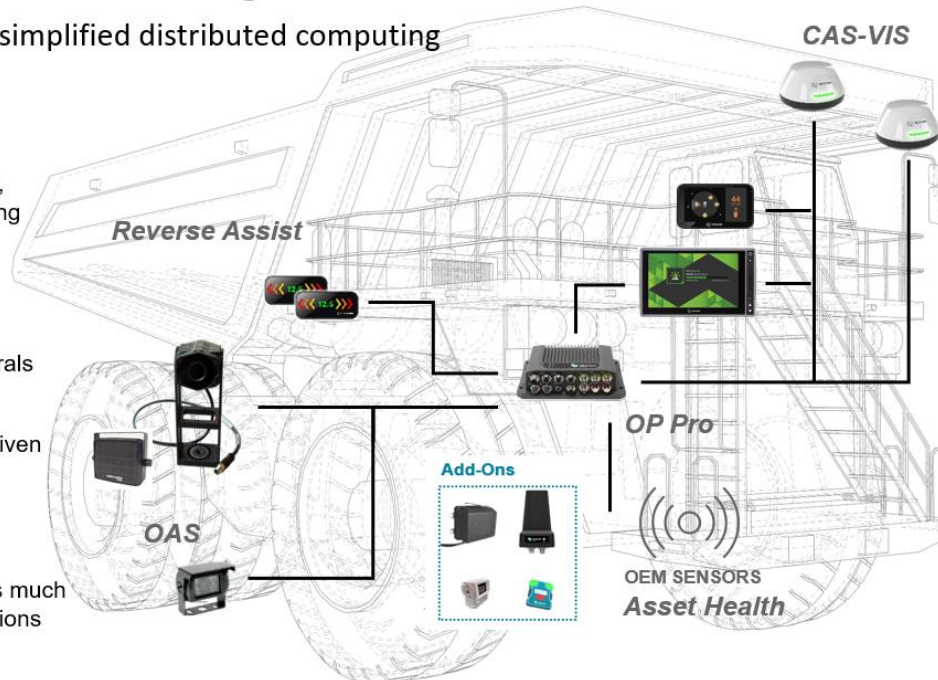
- Ability to seamlessly run multi applications at once
- Multiple IO for required peripherals

#### Display

- 9in Display to deliver context driven applications
- Diagnostics and configuration

#### Complexity

- Reduction in having to install as much hardware to support all applications



Future development - RCT

# What's coming next?

RCT's machine control packages are the essential vehicle control enabler designed to deliver safety solutions sought by the global mining industry.

We will continue to build on our successful record of developing, installing, and supporting RCT smart solutions with the assistance of distributors and service providers globally.

Over the coming year there are going to be MIC design improvements to suit all vehicle types from Light Vehicles to large mining fleet.





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Thank you!

[Website](#)

[rct-global.com](http://rct-global.com)

[hexagon.com/mining](http://hexagon.com/mining)