Increasing Productivity and Improving Safety with Collision Avoidance Technology

Presented By: Sean Martell

Roadmap

- Why is Surface Mobile Equipment safety so Important
- How MSHA handles the issue.
- Who is PRECO Electronics
- The Reality of Accidents
- The Challenges with Behavior
- Are You Capturing All of Your Costs
- Risk Reduction ROI Approach to Safety Dollars
- How to Drive Successful Safety Technology Implementation
- What's the Deal with Radar
- Applications
- Questions

The Visit to a Family You Never Want to Make

• **Fatal Powered Haulage Accident**

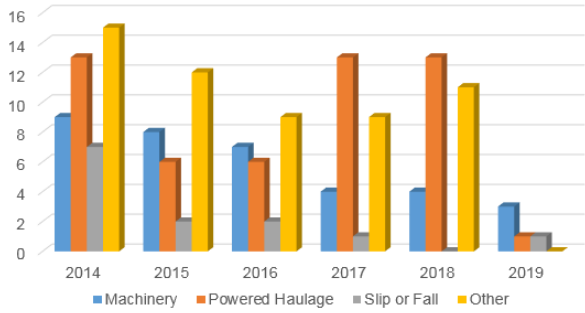
Cyprus Sierrita Corporation (mine)
I.D. No. 02-00144
Cyprus Sierrita Corporation
Green Valley, Pima County, Arizona

March 19, 1996

The Visit to a Family You Never Want to Make

- Alfred M. Wade (Big Al), electrician, age 44, was fatally injured on March 19, 1996, at 5:36 a.m., when a haulage truck in the pit ran over the light maintenance truck he was driving. Wade had a total of 13 years, 6 months mining experience, with 7 years, 39 weeks at this mine and 3 years, 39 weeks as an electrician.
- Mine located near the CAT proving ground.
- First copper mine to implement a truck dispatch system.

Fatalities and Cost of Accidents



Approximate US yearly average trucking accidents = 500,000
Approximate US yearly trucking **fatalities** accidents = 5,000

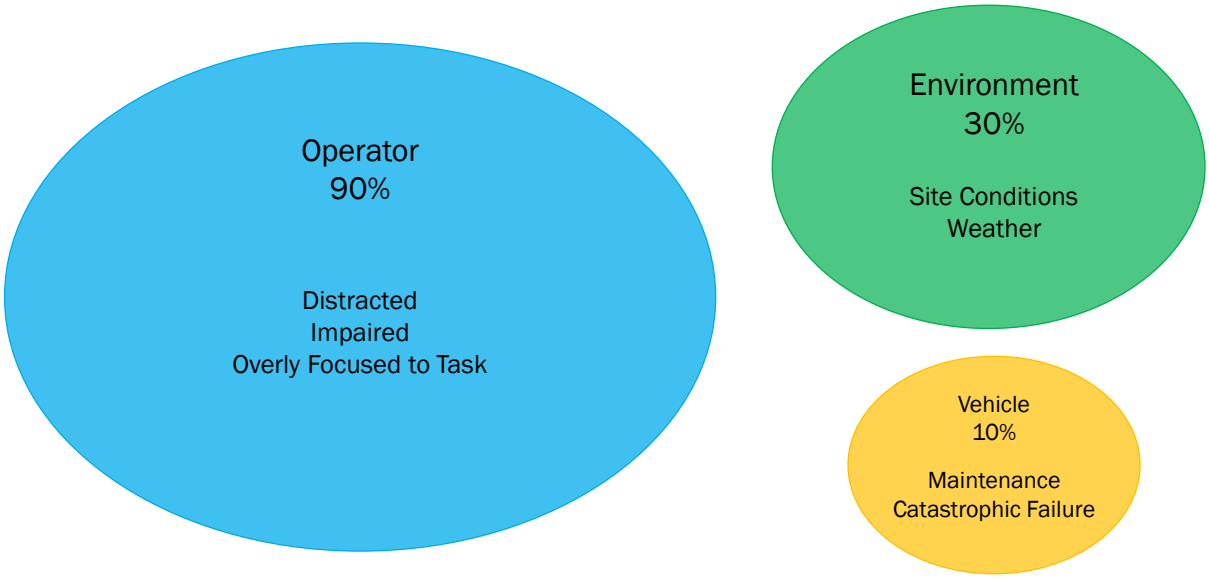
Average cost per truck accident = **$148,279**

Additional revenue needed to pay for cost of accident assuming a 2% profit margin = **$7,413,950**.

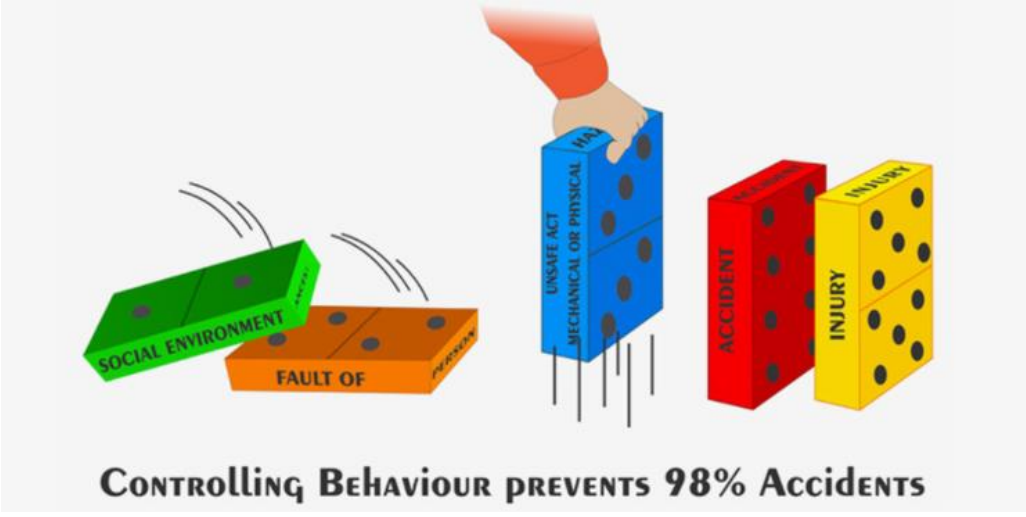
Average cost of a **fatality** truck accident = **$7,633,600**.

Worker fatalities
5,333 workers died on the job in 2019 [https://www.bls.gov/news.release/cfoi.nr0.htm] (3.5 per 100,000 full-time equivalent workers) — on average, more than 100 a week or about 15 deaths every day. About 20% (1,061) of worker fatalities in private industry in calendar year 2019 were in construction – **accounting for 1 in 5 worker deaths for the year.**

The Problem



The Challenge



Breaking Down the Cost Factors

INDIRECT COSTS EXAMPLES

Ongoing Loss of Revenue
•Loss of Clients or Customers
•Lost Sales
•Meetings Missed

Workforce Costs
•Salaries Paid to Employees in Accident
•Lost Time at Work
•Cost to Hire or Train Replacement Workers
•Government Agency Costs

Equipment Expenses
•Damaged Equipment Downtime
•Accelerated Depreciation of Equipment
•Loss of Personal Property
•Vehicle Replacement

Legal Proceedings
•Accident Reporting
•Fines and penalties
•Medical Costs

Damage to your Reputation
In addition to increased public relations costs, and with the rise of social media's influence on spreading the negative publicity and poor public relations, a further impact can be made on a **company's goodwill**.

Breaking Down the Cost Factors

DIRECT COSTS EXAMPLES

Property & Damages
- Cargo Damage
- Vehicle Damage
- Towing Costs
- Storage of Damaged Vehicle

Health Costs
- Injury Costs
- Medical Costs
- Cost of Insurance Increases

Business Expenses
- Immediate Loss of Revenue
- Administrative Costs

By the Numbers

OSHA's $afety Pays website makes it easy for organizations to calculate direct and indirect costs of an accident. As an example, an employee gets a hand entangled in a drill press.
By using insurance company claims data, $afety Pays can calculate that the crushing accident will cost that company, on average:

- Direct Cost: $56,557
- Indirect Cost: $62,212 110% of Direct

- **Estimated Average Total Cost**: **$118,769**

Radar's Incident Reduction ROI

Risk-Reduction ROI

$$\frac{\text{(reduction in risk '\$' - cost of control)}}{\text{cost of control}}$$

Reduction in risk = annualized rate of occurrence X expected monetary loss for a single event X reduction in probability of risk occurrence with the implemented control =

Identify All Direct & Indirect Costs
6 occurrences with one machine
Direct cost/incident = $ 5,000
Indirect x2 = $10,000
Total cost = $15,000
Reduction in risk = 90%

6 x $15K x .90 = $81,000

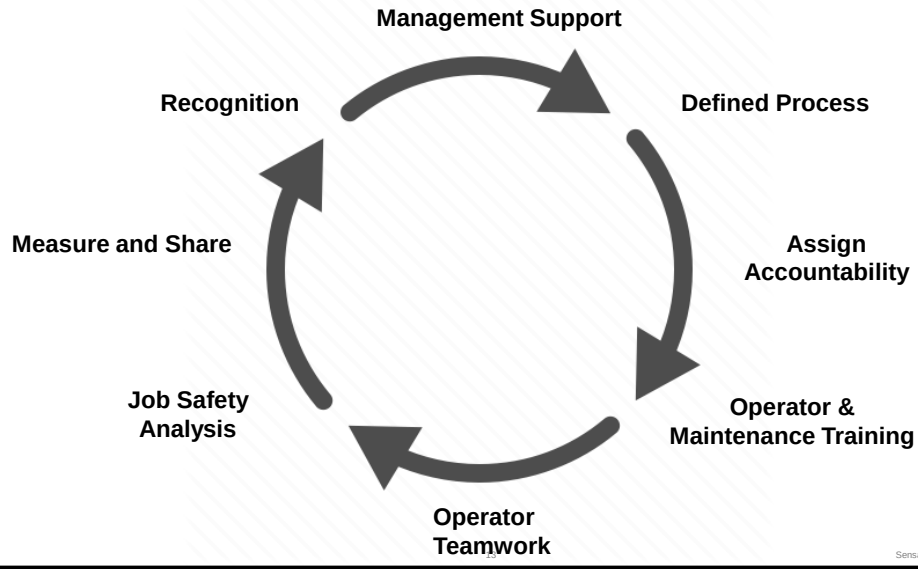
$81,000 − Cost of Control $5,000 parts/labor/training = $76,000 / $5,000

15.2 ROI or 1520% Per Year

Saving/Year
15.2 x $5,000

$76,000 Savings/YR

Support Driven Success



Support Driven

Customer Experience and Feedback Using Active Radar Safety Technology

Reduction in Struck-By Incidents Improvement **50% to 99%**

The Key to Improvement

The more engaged and supportive a company's safety and site operations involvement, the greater the improvement in reducing accidents.

OSHA estimates that construction **companies save $4 to $6 for every $1 invested in safety programs**.

How Does Radar Work?

RADAR = Radio Azimuth Direction and Ranging

Discovered in the 1880's!

RADAR 's biggest technology advantage – Superior penetration capability through any type of weather condition.

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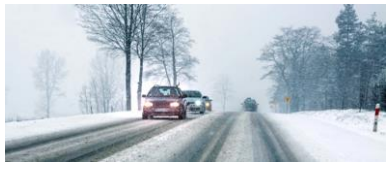
Radar's Technological Advantages

Weather Factors

Site Conditions



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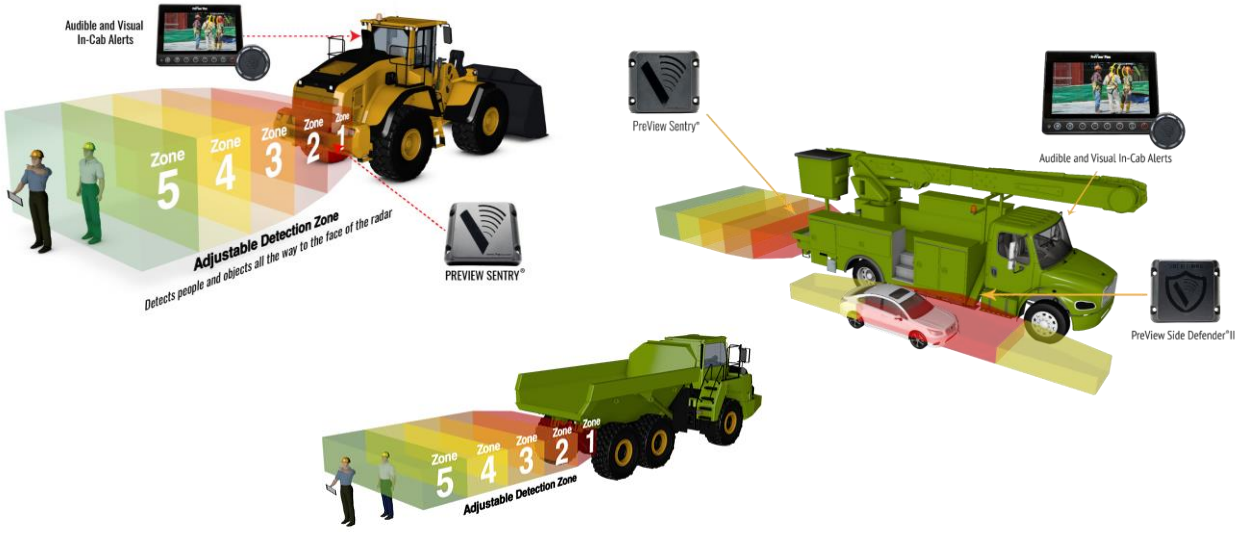
Radar Configuration Examples



Sentry Radar Demonstration

Applications

- On Road
- Off Road
- Mining
- Construction
- Utility
- Waste
- Transportation
- Custom Applications

MSHA Proposal: Safety Program for Surface Mobile Equipment

- September 8, 2021 - MSHA announces a proposed Surface Mobile Equipment Rule.
- Comments were due November 8, 2021.
- Public hearing held January 11, 2022
- Final rule – Coming this Summer to a mine site near you

The Proposed Rule – Highlights

- Operator employing six or more miners. (not sure why)
- Develop and implement a written safety program for surface mobile equipment no later than 6 months after the effective date of the final rule. (need more time)
- Surface mobile equipment is defined poorly. (needs fixed)
- Does not apply to belt conveyors. (good idea)
- Each operator must designate a responsible person to continuously evaluate mine operations. (bad idea)
- Incorporating manufacturer's recommendations into the program. (horrible idea – will lead to havoc in the industry)
- Training should be incorporated into existing training requirements. (common sense)

What Goes in the Written Safety Programs?

(1) Identify and analyze hazards and reduce the resulting risks related to the movement and the operation of surface mobile equipment;

(2) Develop and maintain procedures and schedules for routine maintenance and non-routine repairs for surface mobile equipment;

(3) Identify currently available and newly emerging feasible technologies that can enhance safety at the mine and evaluate whether to adopt them; and

(4) Train miners and other persons at the mine necessary to perform work to identify and address or avoid hazards related to surface mobile equipment.

Next Level of Solutions-Proximity Warning Systems (PWS)

- All have advantages and disadvantages and different sensing methods

- Collision Warning
- Collision Avoidance
- Infrared Passive
- Infrared Active
- Ultrasonic – Pulse
- Radar – Pulse
- Radar – Doppler
- RFID Passive
- RFID Active
- GPS
- Video Cameras
- Magnetic Passive
- Magnetic Active

Advantages

- Compact and easy to install
- Good for long distances in fog
- Measure vehicle speed
- Simplicity
- Accurate; covers wide area
- Great accuracy over short distances

Disadvantages

- Environment concerns affect accuracy including temp., dust, and water
- Objects trigger the alarm; snow and ice buildup
- Operator must observe monitor
- Accuracy issues when metallic issues in field
- No range info, orientation sensitivity
- Generally short range
- Not easy to implement or retrofit

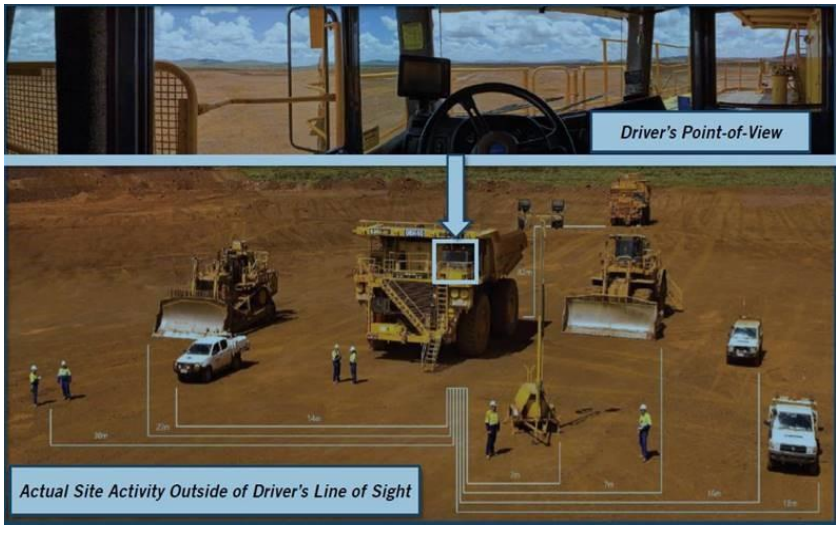
Collision Warning System (CWS)

- Provide Equipment Operators with an Awareness of the Location of Nearby Personnel, Light Vehicles, Stationary Structures, and Other Pieces of Equipment through Display Screen in the Operator's Compartment and through Audible and Visible
- Does not take over control of the Equipment

Collision Avoidance System (CAS)

- Operates the Same as CWS Except that CAS can take Control of the Mobile Equipment to Slow Down or Stop it Before an Accident can Occur

What the Operators See?



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Let's talk.

I look forward to answering your questions.

Sean Martell
North America Sales Manager
Office: 208.323.7114
Cell: 208.488.5665
Email: smartell@sensata.com

www.preco.com