



# Joy Global

**FOCUSED** ON THINGS THAT MATTER

## *RIN 1219-AB65*

## *Proximity Detection Systems*

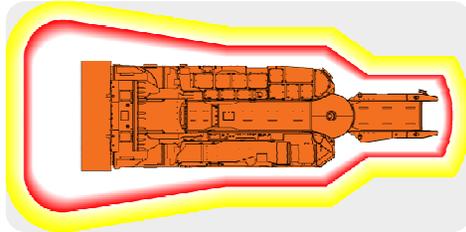
**Brian Thompson**

Global Product Director  
Continuous Miners



# JOY Proximity Philosophy

*Working to improve operator habits*

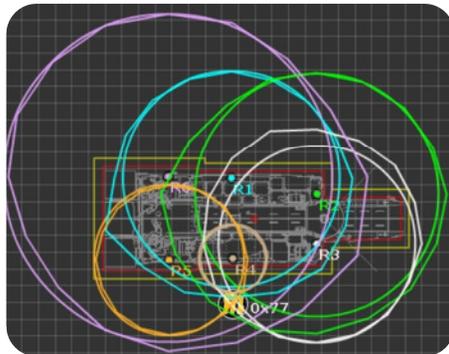


## A Long Process

*Jointly developed a system with Massey/MSHA/Nautilus 4-5 years ago*

*Led to one of first MSHA approved systems*

*Partnered with Matrix in 2009 to develop a better solution for continuous miners*



## Functions as a Training Aid

*Goal is to teach safe operator habits*

## System Reliability is Critical

*No system will be accepted or used effectively if it's not reliable*

*An unreliable system does not improve operator safety*



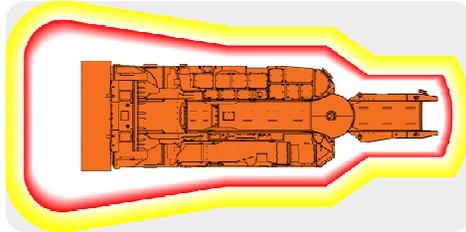
## Limitations

*All electro-magnetic based systems are subject to potential interference from other sources – ie. Coiled trailing cable, large metal objects, power centers*



# System Experience

*Working to improve operator habits*

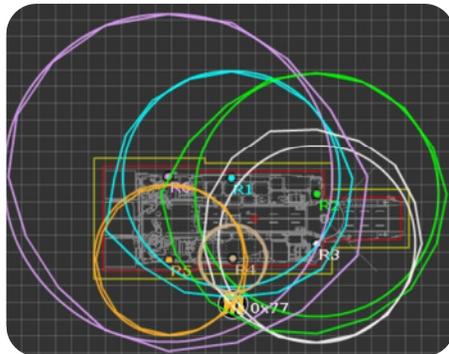


## Field Installations

*30+ machines currently operating at various mines  
(first shipped Oct2009)*

*9 FACEBOSS integrated machines in operation since  
January 2011 ([3]Arch, [2]James River, [3]Alpha, Allied  
Resources)*

*Systems operating with variety of batch and continuous  
haulage systems*



## SMARTZONE Prox-Ready

***New** machines shipped from Joy beginning  
**November 2010, rebuilds beginning November  
2011***

*Includes integrated receiver mounts, controller  
enclosure, and basic cabling*

*Allows for underground installation at a later date*



## Full System Release

*Q4 2011 following successful field trials*



# Critical Success Factors

*Working to improve operator habits*

## Proper Installation & System Protection

Promotes operator acceptance, ensures continued use

Limits system failures due to damage

## Proper Training

Promotes operator acceptance

Limits system downtime through proper troubleshooting

## Understanding Technology Limitations

End users made aware these **systems are not fail safe**

Drives operator awareness through understanding





# Success Factors

*Working to improve operator habits*

## Proper Installation & System Protection

Six receiver mounts located around the machine

Substantial fabrication work required

Ref.p44 “proper functioning..is directly related to the quality of the installation...”





# Rule Considerations

***Rebuild capacity will prohibit implementation timeline***

**75.1732a Machines covered.**

Machines currently in operation - 18 months to comply

**Proper Installation & System Protection**

Requires multiple shifts of cutting & welding

**Must be completed in a workshop to ensure proper protection**

**Example**

$$\begin{array}{r} 1150 \text{ Current US operating fleet} \\ \div \quad 18 \text{ Months to comply} \\ \hline 64 \text{ Machine installations per month required} \end{array}$$

*Note: Joy typically rebuilds 11 machines per month*



# Rule Considerations

## *Rebuild capacity will prohibit implementation timeline*

### *75.1732a Machines covered.*

Machines currently in operation - 18 months to comply

### Proper Installation & System Protection

Requires multiple shifts of cutting & welding

Must be completed in a workshop to ensure proper protection

**Example:** Based on 2010 MSHA recorded tons by region

	N.App	Central App	S.App
Tons/Rebuild	1,500,000	1,500,000	1,500,000
Avg. Tons/Month/Mine	41,086	29,779	30,109
Avg. Months Between Rebuild	36.5	50.4	49.8

Note: Mines with less than 50,000 annual tons excluded from calculations



# Rule Considerations

***Training capacity will prohibit implementation timeline***

## 75.1732a *Machines covered.*

Machines currently in operation - 18 months to comply

## Proper Training & System Verification

Minimum 3 days training per installation

Insufficient training will be detrimental to both maintenance and operation

## Example

	1150	Current US operating fleet
÷	18	Months to comply
	<hr/>	
	64	Machine installations per month required
x	3	Man days of training per machine
	<hr/>	
	192	Man days of training required per month

*Note: Joy's typical capacity is 30 man days per month*



# Rule Considerations

*Working to improve operator habits*

## 75.1732b(1)(ii) Requirements

Machine must stop no closer than 3 feet from a miner

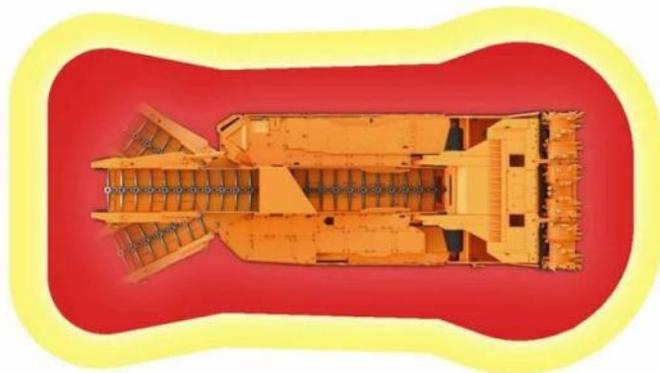
When cutting, machine must stop before contacting operator

## Current Technology is Not Fail Safe

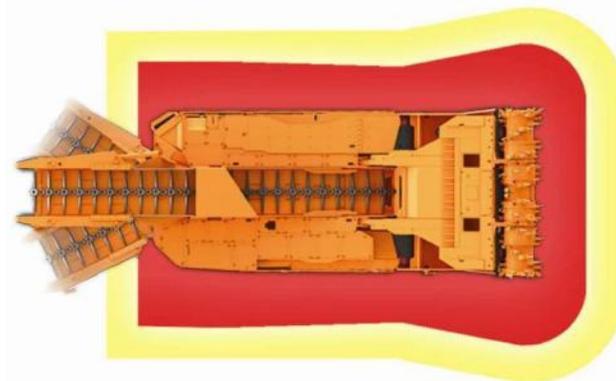
Impossible to prevent contact in all cases, environment will determine stopping distance

Current technology is sufficient for training, not safety system

Zones should not require operator positioning in hazardous locations



Tram Mode



Cutting Mode



# Rule Considerations

*Working to improve operator habits*

## 75.1732b(1)(ii) Requirements

Machine must stop no closer than 3 feet from a miner

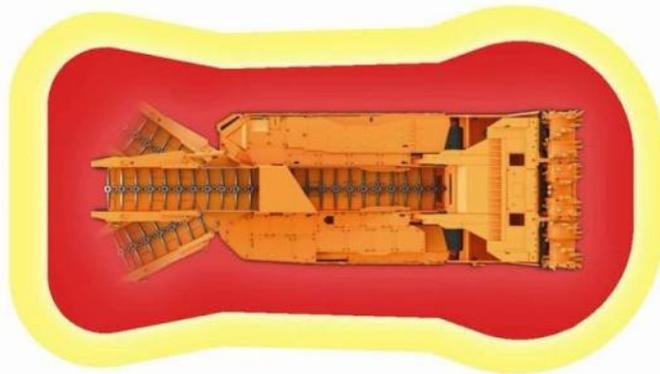
Ref p.33 comments: "all machine movement be stopped"

## Alternate Proposals

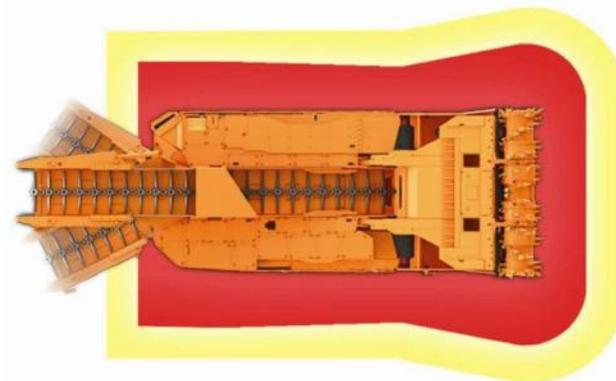
Shutdown process to begin at 3', final machine position depends on environment

Only prohibit functions which cause machine motion, tram and conveyor swing

Allow zone configuration that keep operators away from haulage



Tram Mode



Cutting Mode



# Rule Considerations

*Working to improve operator habits*

## 75.1732b(5) Requirements

Prevent interference with or from other electrical systems

## Current **Technology is Not Fail Safe**

Electromagnetic based systems are influenced by other systems

Examples include coiled trailing cable, large metal objects, power centers





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