Risk of Plant Strikes – Colliding with Plant, Infrastructure or People

What is the situation?

There are three scenarios we must consider:

- Plant strikes other plant.
- Plant strikes an individual.
- Plant strikes a piece of infrastructure or object.

The primary source of control when moving plant is people. This creates a significant risk of incidents caused by human error. There is a great reliance upon compliance and individual competence, which is not always robust.

One of the NR lifesaving rules is for the creation of exclusion zones to separate people from plant, whilst this is embedded into procedures and processes, it is difficult to control and enforce. There is also a cultural issue in this procedure that is difficult to eradicate.

Collisions are costly from both a time and financial aspect as they lead to possession overruns and abortive repair costs. Overrunning possessions impact on our ability to provide train paths for an efficient timetable. This impacts on the fare paying passenger and also damages our reputation with the TOC's/FOC's.

With the increased demands for network capacity, we need to find technological solutions that reduce or eliminate the risk of human error.

fig. 1

fig. 2

Priority problems

Specific priority problems

- People encroaching within machine exclusion zones.
- Reliance on machine operator to be able to react potential risks.
- Uncertainty surrounding limits of electrical isolations.
- Operator distractions.

Related goals

- To reduce likelihood of plant to people collisions.
- To provide automatic detection and control of unsafe machine movements.
- To provide means for automatic detection of Live OLE.
- Remove operator from cab and incorporate remote control into machine design.

Benefits

- Reduction in accident rates and consequential loss.
- Reduction in number of collisions between plant and infrastructure.
- Reduction in risk of electric shock and machine damage.
- Operator in close proximity to point of operation providing greater visibility of machine and load.

Analysis of causes

Specific research needs

People encroaching within machine exclusion zones

Need a bolt on system that can be fitted to any item of plant to automatically alert the machine operator and individual that is encroaching simultaneously. The system shall be adjustable to meet the required exclusion zone of a particular item of plant and incorporate technology that provides individual members of workforce an immediate notification of encroachment without the need for the operator to monitor the exclusion zone. The system shall be linked to a web-based application that provides real-time transfer of information that enables data to be captured and individual performance to be monitored so that repeat offenders can be easily identified. Need to find way to completely remove collisions between plant and people.

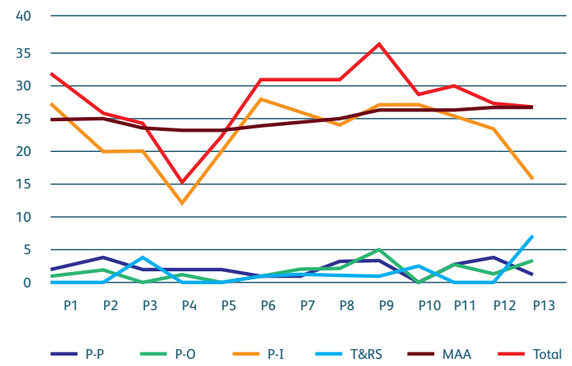
Reliance on machine operator

Need to supplement reliable height limiters with additional means to detect the proximity of machine to infrastructure to automatically stop machine movements if encroaching too close to OLE or other structures such as station platforms. Need to eliminate collisions between plant and infrastructure.

Uncertainty surrounding limits of electrical isolations

Products currently developed do not have proven reliability, nor do they have the ability to screen out signals from adjacent live roads. We Need to be able to accurately detect the presence of Live OLE on the rails on which the machine is mounted to prevent machines moving into non-isolated electrical sections with basket raised.

2016 Period by Period collision data from Plant & T&RS Period Performance Report:



Operator distractions

It is sometimes difficult for operators to clearly see the interaction between the machine and load at the end of the machine boom due to obstructed vision or other distractions. Need to develop remote control systems to remove operator from machine cab and put the operator at the point of operation to clearly manage risk. The system is required to be tactile to provide the operator with the same level of control that he would be afforded in the machine cab whilst giving him full visibility of critical safety functions such as the Rated Capacity Indicator system status.