OSHA set to revive 1965 law on cranes working near power lines.

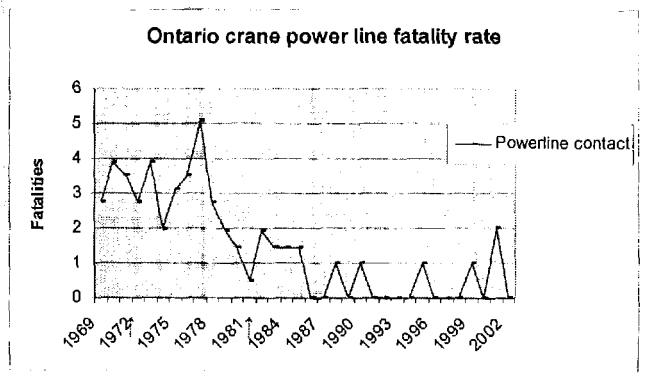
The Occupational Safety and Health Administration, OSHA, has charged the Cranes and Derrick Negotiated Rulemaking Advisory Committee, CDAC, with rewriting the 30 year old Construction Crane Safety Standard 29 CFR 1226.550 relating to cranes and derricks safety. The committee will complete their task by July 2004.

In the USA crane law and practice exists on four levels:

1. Federal law, for the whole USA, is the baseline established via OSHA's Code of Federal Regulations. OSHA enforces this law and may issue citations and fines after fatalities or during complaint driven, or scheduled, inspections. The fines increase dramatically on subsequent similar citations.
2. 23 individual states, i.e. Texas, have elected to enforce their own OSHA standards. These standards must, at least, match the Federal OSHA standards.
3. Any individual state can also add additional laws and penalties, enforced by that state.
4. The lifting and construction industry establishes its own consensus 'best practice' standard under the American National Standards Institute ANSI B30.5 rules. The B30.5 is a voluntary, and enforceable, standard updated on a five year cycle. Another benefit of compliance with the B30.5 is that it can provide a strong line of defense in case of an accident.

Over 30 years a large discrepancy has developed between OSHA 1926.550 and ANSI B30 rules as the result of changing designs, technology and modernized work practices. This discrepancy is the issue that triggered OSHA to charge CDAC to protect workers from current crane hazards and update OSHA's outdated standard.

Consistently, the number one cause of crane fatalities in the USA is power line contact. Recent data submitted to OSHA estimate 58 fatalities and 47 horrific injuries per year. There has been some reduction from 1970's levels due mainly to training. The changes in fatalities due to training are not documented in USA but have been in their close neighbour Canada.



Graph 1 – Fatality rate from crane power line contact in Ontario

Crane training was introduced in Ontario in 1972 and mandated in Canada during 1982 leading to a significant reduction in crane power line contacts. However, there is no overcoming the underlying cause, which is the inability of humans to gauge distance from a visually impoverished object.

Despite the best efforts of operators and 'spotters' they are physically incapable of accurately gauging the distance from any part of a crane to a power line. The minimum safe distance is established as 10 foot from a power line of less than 50 Kv which includes most of the kerbside distribution power lines seen in the US. There are a number of well document reasons why human eyes are unable to gauge a power line against an undistinguished sky. Most significant is the lack of either shadow or other objects with which to make a visual comparison.

No worker sets out to electrocute his co-workers and unintentional errors should not have the potential to result in their paying the ultimate price, the loss of their lives.

CDAC's unanimous approach has been to define the increasing levels of danger as a crane approaches a power line. At each higher level the crane operator is allowed to choose from a 'menu of safety' to add additional 'layers of protection' ensuring that if one layer is breached it will not result in a fatality. The point at which these different danger zones are breached is a function of crane size, reflecting the ability of the crane's fully extended boom to reach a power line.

In the sequence of diagrams the power line proposal by CDAC is shown. It should be clarified that the final regulatory text or distances have not been agreed.

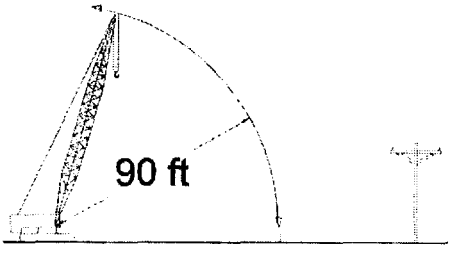


Fig 1 In this typical example a lattice crawler with 90 ft boom approaches a 34kV line on a 38 ft pole. As 34kV is less than 50kV the 10ft prohibition rule still applies. The red, or prohibited, zone is a fixed distance from the power line. The yellow and green zones are a function of crane size. In our example the green distance of no risk to contact power line = Boom (90ft) + 45ft = 135ft.

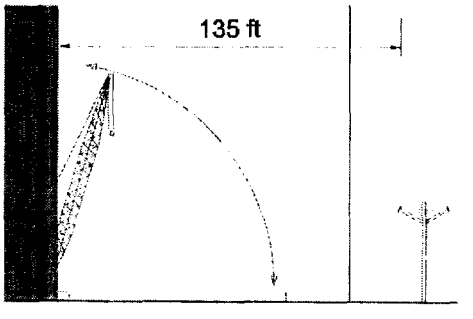


Fig 2 IF green zone breached by axis of boom, 135 ft from crane pivot to power line in our example, the operator must determine the power line voltage and safety strategy.

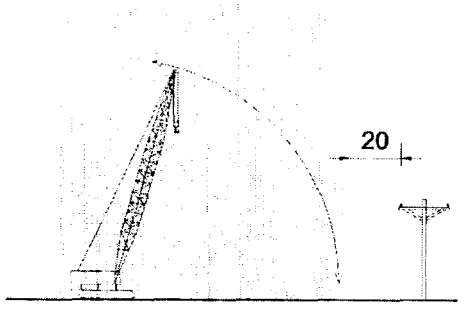


Fig 3 In the yellow zone there is a possibility of breaching the red zone. This yellow distance starts at 135 ft from crane pivot to power line in our example. The operator must pre-plan with utility to turn power off. If that is not possible they must select several differing items from the menu of safety strategies: GPS, barricade, swing limiter, range control, proximity alarm, dedicated spotter, non conductive tag lines, mark ground, ground crane blanket wires, insulated link, site plan.

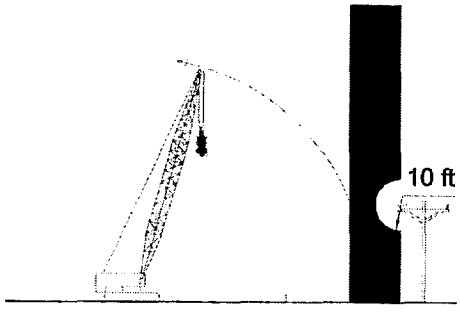


Fig 4 The red zone can be breached in our example at 100 ft from crane pivot to power line. The operator must use an insulating link AND from select several differing items from the following menu of safety strategies: barricade, swing limiter, range control, dedicated spotter, non conductive tag lines, mark ground, ground crane (to provide earth fault sense for utility – not directly protect rigger), blanket wires, site plan.

Fig 5 There will still be a prohibited area whose size relates to the voltage of the power line.

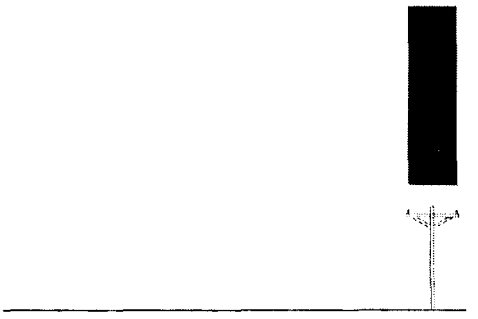


Fig 6 There will be a restricted area above the power lines where power down only is allowed.

While the 'menu of safety' provides choice there are certain additional provisos requiring the 'layers of protection' to be of differing kinds. In other words, 'documentary' layers must additionally have both a 'physical' and 'warning' 'layer of protection'. This could be for instance the Law and barrier and spotter.

The only mandatory 'layer of protection' in the most dangerous zone will be an insulating link – a device designed to prevent the transmission of power to construction operatives. This is not a new idea or law as several states, for example Texas and Arkansas, have laws mandating the use of insulating links. As long ago as 1965 Federal law 8C-29 mandated insulating links but was repealed some years later because the insulator link technology at that time was not reliable.

During the 1980's crane experts published a specification for a reliable insulating link, which would receive their recommendation. At last in 1997, improvements in technology allowed this specification not only to be met but to be greatly exceeded with the introduction of the Load Insulator®.

The existence of the new technology has been used by plaintiff lawyers to win substantial, and unchallenged, out of court settlements for clients, or their next of kin, who have suffered electrocution. Current estimates suggest that that it is **costing** the industry as much as $85m per year by not mandating insulating links. As a further incentive, Load Insulator has offered their technology to all crane manufacturers, for a nominal sum, to save lives and to cut costs.

The decision of the 23 industry representatives of CDAC in January to mandate reliable insulating links was a significant step and reflects their determination to reduce accidents without posturing or politics. They should be applauded for taking a bold stand to confront the horrifying loss of lives among a group of workers whose average age is just 33 years. It is a 'win – win' situation without losers. In fact a plaintiff attorney, Joe Alexander, challenged the committee to mandate insulating links. He told them "put me out of business – I don't want this work, however if you don't mandate insulating links I will gladly take your money".

1275 Words

Hugh Pratt, nominated for CDAC, has been attending all the CDAC meetings. He has been involved with under the hook technology for 18 years and a world authority on Insulating links. He holds several engineering degrees, five prestigious awards and 18 patents. He is currently finishing his PhD in High Voltage Engineering.