PowerNet

2019 Safeguard Awards

Category 5
INNOVATION

PowerNet line mechanics with the pole grab.

The Pole Grab

Industry Game-Changer

"The pole grab is an awesome piece of kit that has enabled our work tasks to become safer and easier to complete."

Hector Diamond, PowerNet line mechanic

New Zealand's electricity network is in many places an aging network, with a significant number of power poles timetabled for replacement now and over the coming decades. Without good safety equipment and practices, working with power poles can be a dangerous and challenging task for electricity line mechanics.

Joe Reti, a field training officer at PowerNet, identified a safety risk to field teams when accessing failing poles. He recognised the need for a piece of equipment that could safely manoeuvre power poles in challenging locations.

Due to their weakened state and sometimes poor condition, failing poles must be handled with greater care. If situated in places where it's not possible to gain easy access with a bucket truck and crane, or where there is no safe way to support the pole, the risks are compounded.

To counter these risks and improve field teams' safety, Joe and the PowerNet team designed and developed a fit-for-purpose, custom-made pole grab that would create a safer environment for field teams working with power poles.

This innovative solution is a lighter-weight pole grab that allows greater safety, manoeuvrability and flexibility when removing and replacing poles. As replacing or repairing poles is a daily task on any electricity network, this invention has the potential to make working with power poles significantly safer for not only PowerNet's field teams but also for teams working on electricity networks throughout New Zealand and across the world.

The pole grab in action.

RECOGNISING **THE PROBLEM**

Back in 2016 PowerNet developed a comprehensive safety testing procedure that field staff completed before accessing pole structures. With an ageing network it is essential that we protect our people from fall and height risks. In general, the unpredictable nature of working with failing poles significantly raises the risks for field teams.

In general, there are several factors that can compromise safety when working with pole structures. It can be challenging to gain safe access to a site where a pole needs to be worked on, removed or replaced. This can be due to terrain, or factors such as inaccessible driveways, or the poor condition of a pole due to deterioration or due to an event.

One example of such a situation is when a vehicle crashes into a power pole. Line mechanics are often required to attend these kinds of incidents to make the crash site electrically safe for medical or fire personnel. In this situation first responders must deal with wires not only pulling a pole in unpredictable directions but also adding significant weight to pole components that are no longer in workable positions. Adjacent structures such as the poles on either side may also need to be supported due to the loading applied from the broken pole; historically a team would access the structure via a ladder to apply the chain support attached to the crane. This could potentially place the team in a high-risk situation if the pole failed.

In cramped locations, there may be no room to manoeuvre a bucket truck and crane on site, or to set up a job safely, including the option of bringing in an additional vehicle for support if needed. This means there may be no support to protect a line mechanic.

If a lifting chain support fails or lines hardware falls when lines teams are installing poles, team members would need to enter the `drop zone' (the area where a pole could potentially fall), creating an injury risk.

These scenarios create a significant safety risk when staff are accessing a pole structure to apply support, in that a pole may fall over and injure staff or damage equipment.

CRAFTING **A SOLUTION**

Crafting a solution began in 2016 when Joe and PowerNet managers were discussing staff safety concerns while working with poles. Management and Joe discussed potential solutions and a general concept was created. Joe was then tasked to develop a solution—he began by drawing a sketch of the pole-grab design on an A4 piece of paper, before `getting the green light' from management to investigate developing this new piece of equipment. The goal was to develop a piece of equipment designed specifically for the electricity distribution industry to make the workplace safer for field teams working with power poles.

Joe considered combining different technologies that already existed and integrating these with a lighter-weight piece of equipment that could be used in challenging everyday work situations.

The pole grab at work.

"The main aim was to build a piece of equipment that was fit-for-purpose, easy to detach from a crane, and constructed from the right material to make it light enough to be flexible and easily manoeuvrable for the end user."

Research into options showed that any existing commercially-available pole grabs were either too heavy (weighing around 1 tonne) which would render PowerNet's crane trucks unfit for purpose, or too small for the network's historic concrete poles. Developing a product that was lighter-weight but strong was critical. The goal was to combine design, capacity and weight-loading to create a fit-for-purpose piece of equipment. The development phase included engaging a local engineering company to undertake weight-load bearing calculations.

An early mock-up didn't eventuate due to the manual handling involved for the end user, so Joe went on to look at other designs and hydraulic equipment. A customised design was needed, and, by working closely with SEC Engineering and Jesco Hydraulics and Pneumatics, Joe and his team were able to realise their design when their initial concept was turned into a prototype.

Check out how the pole grab works by viewing the video included with this entry.

The prototype is made of steel and weighs 180kg. It allows line mechanics to hold broken poles and climb poles that have questionable integrity. It can also be attached to a range of vehicles, including smaller trucks.

A safety interlock system allows the pole grab to support the pole structure in a held position by utilising a lockout switch that needs to be consciously operated to open and close the supporting claws.

The hydraulics control bank uses an electric change-over system. Key considerations in developing the prototype included understanding how to integrate the electric change-over and safety interlock system on a truck in a way that meant only minimal change was required. Being able to achieve this means that the attachment is compatible with Powernet's fleet of crane trucks and that the existing hydraulics only require minimal modification to operate the pole grab.

Throughout the process, PowerNet supported Joe with significant investment to innovate. Joe has collaborated with people from throughout the company—sharing his concept and highlighting the benefits with company directors; management; the health, safety, environment and quality team; and field teams, to achieve the best outcome.

Teams familiarising themselves with using the pole grab.

THE SOLUTION'S **SAFETY BENEFITS**

The prototype pole grab equipment creates a safer working environment for all field teams working with power poles and eliminates significant safety risks. It can be used in challenging situations to support the safe removal of a pole, particularly a failing pole, as it supports the pole structures on either side thus mitigating safety risks to workers.

Together with its safety features, the pole grab's lightweight frame means it can be used on smaller vehicles to clamp larger poles. Its versatility and adaptability for different types of plant and equipment make it more cost-effective.

The pole grab prototype is now being trialled on the PowerNet network to identify potential applications and to test usability and reliability.

Trial results are positive. The prototype pole grab is giving staff the capability to safely manipulate poles when installing, straightening or removing them, without being under or around a load.

The pole grab is proving to be a practical, fit-for-purpose solution that makes every day work in the field safer for line mechanics. Whether it's pulling poles, removing or adjusting them, this innovative, custom-designed equipment is likely to be a game-changing tool for worker safety.

ABOUT POWERNET

Powernet Ltd is New Zealand's fourth largest electricity management company. The company's vision is to deliver safe, efficient and reliable power to its communities and to add value for its stakeholders.

PowerNet manages most of the electricity assets in southern New Zealand. It builds, maintains and manages assets across Southland, West Otago, Queenstown Lakes, Central Otago and Stewart Island on behalf of electricity network owners.

PowerNet operates and maintains electrical distribution network assets that are mostly overhead poles and wires, and substations. There are also extensive underground networks in urban areas. There are over 70 substations on PowerNet managed networks.