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| **Topic entry (tick boxes that are applicable) 1 [ ]  2 X 3 [ ]  4 [ ]  5 [ ]  6 [ ]  7** **[ ]  8** **[ ]**  |
| **Entry number (MPA Ref)** | 22079 |
| **Title of Entry** | Lithium Battery – Recharger Cabinet  |
| **Name of Company** | Tillicoultry Quarries Ltd  |
| **Location** | Northfield Quarry |
| **Video** **[ ]  (if yes, please include URL for video)** | Yes |
| **Other resource** **[ ]  (if yes, please include description)** | 4 images |
| **Fatal Theme (tick boxes that are applicable) 1** **[ ]  2 [ ]  3** **[ ]  4** **[ ]  5** **[ ]  6** **[ ]**  |
| **BACKGROUND** |
| An incident occurred at one of our quarries involving a battery powered impact gun. One of the operators put the battery onto charge in the tool store, which was located in a steel container. Two hours later it was recognised that smoke and visible flames were coming from tool store, the emergency services were called, and the power isolated. The photographs demonstrate the exact nature of the damage created. Findings established during the investigation.* The incident occurred at the charging point for the impact gun charger / lithium-ion battery.
* The impact gun is powered by an 18-volt lithium battery that is charged within a stand-alone 240v charger unit.
* Plant operator put the battery onto charge in the tool store in an 20ft steel container, no defects with the charger or battery were noticed on the pre-charge inspection.

It was situated on a metal shelf and the charger was plugged into 240v internal fitted 3 pin socket which was used on a regular basis with no issues or faults reported. |
| **MANAGEMENT OF PROCESS** |
| Following the above incident it was discussed, at an internal business meeting, how this could be avoided in the future. One of our quarry managers engaged with their quarry engineer to fully review the incident to formulate ideas to prevent a reoccurrence. The engineer carried out a risk analysis of charging these types of batteries and started to look at the Hierarchy of Control. The charging of batteries could not be eliminated or substituted as returning to mains cabled power tools in a quarrying environment was reintroducing risk to the operations that had been eliminated with the introduction of battery powered tools.A solution was designed and fully discussed with the quarry manager and health & safety manager. The fitter presented his design of a stand-alone bespoke metal cabinet to house the battery chargers. The design also took into consideration what would happen if the batteries when charging overheated and caught fire. Three elements have to be present for a fire to take hold, the heat element was there from the charging process and fuel is present in the form of the chemicals in the batteries. The solution was to restrict the flow of Oxygen to extinguish the potential fire as quickly as possible. Water was ruled out as electricity was present and connected to the main power source, which added further hazards if applied in event of the fire. The quarry engineer recognised the quarry where he worked has an asphalt plant and was generating reclaimed filler. Trials were done and filler was bagged and placed above the battery station - in the event of a fire the heat would melt the bag and the filler would smother the fire quickly.The concept was then further presented to the management who authorised the cabinet to be fabricated to allow trials to commence to test the theory and design.Quarry engineer Sean Swales then proceeded, fabricated the charging cabinet and started to do test the design tangibly. As demonstrated in the attached photographs and videos the results were really satisfactory. When a fire was replicated within the cabinet, the heat flame generated melted the bag of filler sitting above and smothered the fire within 20 seconds. |
| **BENEFITS** |
| As battery powered tools are becoming increasingly used across the business, reducing the risk of fire damage is an increasing benefit.The design of the charging cabinet allows the recharging of the power tool batteries to be carried out with confidence so that if anything does occur with batteries overheating, the design of the charging cabinet would extinguish a potential fire very quickly and thereby stopping wider fire damage.This charging operation allows our employees & contractors to work in a safer environment along with the ability to increase the number of batteries to be charged making the maintenance operations more efficient. This will also give the business the ability to increase the range of battery powered tools at the units we operate, reducing reliance on cabled powered tools in a hazardous environment, trip hazards with trailing cables and extensions etc.  |
| **INNOVATION** |
| This is a bespoke design devised by one of our quarry engineers who has used his experience, knowledge, health & safety training to design a fit for purpose battery charging cabinet that creates a safer working environment, along with more efficient purchasing of future equipment for the business.The attached video demonstrates how successful the design is and can smother a fire in about 20 seconds limiting any knock-on damage.This design is completely transferrable across a number of industries that use and rely on safe battery charging for its operations.  |
| **DEVELOPMENT & TRANSFERABILITY** |
| Following the successful trials, 2 cabinets have been installed at Northfield Quarry. The cabinet designs were shared to other unit managers within Tillicoultry Quarries and have been installed at other units with more planned as the use of battery powered hand tools increases across the business. |
| **NB if document has embedded images try and include these****If other documents provided say additional information available.** |