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Power: A Discourse on Cords

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In September 2007, an employee was electrocuted as he cut sheetrock. An unfortunate accident? But if the definition of an accident is "an event that is without apparent or deliberate cause," this wasn't an accident.

Count how many problems you see in this scenario, taken from OSHA's accident report:

> The employee used a refurbished double-insulated saw with a spliced cord to cut sheetrock. The saw was plugged into a 120-volt extension cord, plugged into a power strip, which was plugged into another extension cord. That was plugged into a GFCI-protected outlet. The extension cords had lost their grounding pins. The temperature was hot; the employee was sweating. To keep the cord out of his way, the employee wrapped it around his neck, so the plug was resting on the left side of his chest. The medical examiner found no burn marks on his body. The cause of death: cardiac dysrhythmia due to low voltage electrocution.

How many problems did you find?

1) The cords were daisy-chained, plugging extension cord into extension cord. That probably didn't contribute to his death. But it would have increased the resistance. Increased resistance reduces the power to the tool, making it work less effectively (so maybe the employee had to work harder, making him sweat more). And any junction, where a cord is plugged into another, can be a shock and fire hazard if the connection is partially pulled apart. In this case, there were at least five junctions.
2) The extension cords weren't grounded, so the easiest path to ground was through the employee.
3) The cord was inadequately spliced, not insulated enough to prevent someone from coming in contact with electricity.
4) Sweat is a great conductor of electricity. Put the inadequately insulated cord against a sweaty chest, and you'll deliver a shock directly to the heart. The result: one death.

You have lots of electrical cords in your shop. Your employees use them all the time. Are they choosing them correctly? Using them correctly?

Any extension cords in your shop need to be grounded, hard service cords with undamaged insulation. Hard service cords will be round, not flat, and will have three prongs. If you see flat cords, get rid of them. If the

grounding pin is missing, take the cord out of service. If you can see the wires inside the cord, it isn't a safe cord to use. The cords for tools also must be undamaged. A common problem: damaged strain relief, where the plug has begun to separate from the cord, exposing the wires.

Do you have to throw away the damaged cord? Can you repair it? Maybe. If you have a damaged tool cord, the only repairs allowed are those that maintain the UL or equivalent listing for the tool. That usually means that the work has to be done by a factory-authorized repair center. Plugs on extension cords can be replaced, but only if the work is done by a "qualified person," using appropriate approved parts (approval or listing could be from UL, Underwriters Laboratory, or from another nationally recognized testing laboratory).

What's a qualified person? It's someone with the knowledge, training and experience to do the electrical work correctly. You as the employer have the responsibility to determine who's qualified, and that will vary depending on the extent of electrical work done. If you don't know what could go wrong if you mixed up the black and white wires, you are not a qualified person.

Another fatality report, from 2015: An employee was inspecting a malfunctioning vending machine, plugged into a 120-volt, 20-amp outlet. The machine had been incorrectly wired: the ground and hot conductors were reversed. He touched a part that was supposed to be grounded but was hot, and he died. Wiring a plug is easy – but if you do it incorrectly, it could kill.

What if the damage is to the insulation, not the plug? You might be able to shorten the cord (again, only if that's done by a qualified person). You can't repair it by wrapping it with electrical tape. That doesn't provide the same insulating ability or same flexibility as the original jacket. You can't splice it, unless it's at least 14-gauge and the splice maintains the same characteristics as the original cord. Really, it's probably easier to just toss the cord.

Choose a cord that can handle the load. Use the shortest one that will do the job. Longer cords build up more resistance, robbing you of power. They also become tripping hazards. You could carefully wind up all the excess cord into a neat pile, but that increases the fire risk, because it prevents the cord from dissipating heat.

If you need to plug in your cell phone charger, portable drill, and rechargeable work light, use a power strip (UL calls these relocatable power taps). The rules for using these: they can be left plugged in, as long as they're plugged into permanent outlets. They need to have overcurrent protection (cheap orange multi-outlet adapters don't have this, so they're not allowed for industrial use). Don't permanently mount the power strip – you have to be able to remove it without tools. And most important: don't use it with high amp loads such as heat guns, microwave ovens, toasters, or other heating appliances.

There are rules on how cords are used. They can't substitute for permanent wiring. They can't go through holes in walls, ceilings, or floors. They can't be attached to building surfaces. They can't be hidden behind walls, ceilings, or floors. Those rules, found in OSHA standards, the Fire Code, and the Electrical Code, aren't arbitrary decisions intended to make your life harder. Instead, they exist because of fires and electrocutions caused by cord misuse.

You can use an extension cord to plug in a fan. You can use it to operate a buffer. But unplug the cord after each use. Putting up a Christmas tree or other temporary exhibit? You can leave the extension cords plugged in for up to 90 days for those temporary installations.

A 2017 report from the National Fire Protection Association estimated that over 16,000 non-home electrical fires were reported each year from 2010-2014. Cords and plugs accounted for only 10% of fires (home and non-home), but nearly 30% of fatalities. Keep that in mind next time you reach for that cheap little white cord – it could be a killer.

This article is intended to provide general information (no advice) about current safety topics. To discuss your specific concerns and how CHESS may help, please contact CHESS at 651-481-9787 or chess@chess-safety.com

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