

Wood Dust Collection and Static Electricity

Static buildup in woodshop dust systems is a legitimate cause for concern even though nuisance discharge, getting zapped, is by far the most common effect. Unpleasant but harmless shocks most often originate in PVC ductwork or at machines isolated by nonconductive flex hose. Much more serious is the potential for explosive ignition or fires originating in smoldering dust in larger industrial collection systems. A modern concern wherever static buildup occurs is the risk of the damage or destruction of digital devices.

Electrostatic discharge causes billions in losses each year to digital devices. A single spark can burn a hard-to-identify, still-harder-to-fix discontinuity in a complex but fragile circuit. Even before factoring in downtime, replacement parts and technical services can cost more than the digital device did originally. Worse than outright destruction, arcing static can burn microscopic holes in a still-functioning circuit, holes that result in sporadic malfunctions the cause of which is very difficult to identify. Fortunately, proper isolation and grounding as part of a thoughtfully designed dust collection system can prevent these costly aggravations.

Until recently, 4" and 6" PVC Drain Waste & Vent (DWV) pipe was an economically attractive alternative to high quality steel ductwork for small shops. Although arcing and sparking are less pronounced in damp climates, such systems invariably generate static while in use. A light gauge, bare copper ground wire installed outside PVC duct and grounded to the machine can solve the nuisance-shock and fried-digital-devices threats. But what about the explosion hazard?

More than twenty years ago, mathematician and electrical engineer Dr. Rodney Cole, now retired but still working part-time at MIT's Lincoln Lab, investigated static discharge explosions and the electrical theory behind them. His inquiries relied on the research journals of electrical engineering and formal documentation of fire investigations rather than often baseless internet claims. Though you can't prove a negative proposition, Dr. Cole found no evidence of a static caused wood dust explosions in small dust collection systems. He did, however, find that industrial systems could sometimes achieve potentially explosive concentrations of fine airborne dust. Now National Fire Protection Association codes demand grounded metal ducts for collection systems capable of handling 1,500 cubic feet per minute or greater volume.

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