



DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ADMINISTRATION

NOISE REDUCTION INNOVATIONS TO IMPROVE SAFETY

Exposure to excessive noise in the workplace is a serious health and safety problem. Hearing loss or impairment can result from exposure to excessive noise caused by equipment and the work environment. Along with engineering solutions, administrative controls, and personal protective equipment guidelines already in place, Caltrans is now providing an additional engineering solution to reduce noise exposure. The Office of Health, Safety and Training has partnered with D4 Division of Maintenance to review and recommend the purchase of the Hilti TE 70-ATC / AVR Combiammer and the Hilti TE-1000 AVR Jackhammer to replace pneumatic drills and jackhammers, alleviating the need for air compressors.



D4 Maintenance Crew Using the Hilti TE-1000 AVR Jackhammer



D4 Employee using Hilti TE 70-ATC /AVR Combiammer

DECIBEL COMPARISON

The noise level generated by Hilti's TE 70-ATC / AVR Combiammer is 99.5 decibels (dB), slightly louder than an electric drill. The Hilti TE-1000 AVR Jackhammer is 87 dB, slightly quieter than a passing motorcycle. For comparison, a pneumatic drill is 120 dB, the same as an ambulance siren. A pneumatic jackhammer is 130 db, the same as a jet plane taking off at a close distance.

GENERATORS VS. AIR COMPRESSORS

The Hilti TE 70-ATC /AVR Combiammer and the Hilti TE-1000 AVR Jackhammer are both powered by electricity, either from an outlet or a generator. On the other hand, pneumatic tools run on air compressors, which are very loud compared to generators. This reduces noise emissions even more at the worksite. There is a gain in productivity, as well. Setting up tools to run on an air compressor takes a significant amount of time and also poses other safety risks, while equipment running on a generator requires no set up.

INNOVATIONS TO CONTROL SILICA DUST EXPOSURE

The Office of Health, Safety and Training has long been concerned about the health challenges posed by silica dust in the workplace. Silica dust is a potential occupational carcinogen which has been associated with respiratory and other diseases. Occupational exposure to silica dust often occurs as part of common workplace operations involving cutting, sawing, drilling, and crushing of concrete, brick, rock, and stone products. In the past, Caltrans has provided engineering solutions, administrative controls, and personal protective equipment, and now Caltrans is providing another engineering solution. The Office of Health, Safety and Training has partnered with D4 Division of Maintenance to review and recommend the purchase of the Hilti TE-CD Hollow Drill Bit and the VC 20-U Vacuum Cleaner. This engineering solution replaces the conventional rotohammer. The innovations described here make the workplace safer by preventing employee exposure to silica dust.



D4 Employees Working In Confined Area without Vacuum



Hilti TE-CD Hollow Drill Bit

HOW DOES THIS TECHNOLOGY WORK?

As a hole is drilled, the vacuum pulls silica dust—along with other materials such as concrete dust, concrete slurry, wood chips, other dust, and debris—through the hollow bit and a HEPA filter and into the vacuum tank.

IMPACTS OF USE

Improved Worksite Safety: Caltrans employees are exposed to silica dust and other particles on a daily basis in the workplace. For example, the top right photo shows a situation of maximum exposure when employees are working in a confined area. The second and third photos show employees using the Hilti TE-CD Hollow Drill Bit and the VC 20-U Vacuum Cleaner in common work settings. When using the Hilti VC-20-U Vacuum with HEPA filter, 99.97% of silica particulates of 0.03UM or larger are removed from the environment. This technology keeps harmful dust out of the air, making the workplace safer and reducing need for masks and respirators.

Productivity Gains: Because dust is vacuumed during drilling, there is a gain in productivity because manual cleaning of the holes is no longer necessary. Employees do not have to blow and brush the holes. Dust is removed while drilling is in progress. Setting can be done safer and faster.



Hilti VC 20-U Vacuum Cleaner Attached to Drill with Hollow Bit



D4 Employee Using Hollow Bit/Vacuum for Dust Control

IMPLEMENTATION

The noise reduction and silica dust control equipment has been used since January 2014 by four to five crews in the South / West Bay Maintenance Region and by Specialty Region Electrical. Because there has been such a positive response from employees using this equipment, we anticipate that these innovative engineering solutions to silica dust and noise reduction will be adopted throughout District 4 in the near future.



D4 Employee Using Hollow Bit/Vacuum for Dust Control