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16. ABSTRACT Caltrans Department of Transportation (DOT) must provide the best available training to its Maintenance personnel, particularly heavy equipment operators. This research study evaluated the applicability, return on investment, and training effectiveness of heavy equipment simulators to optimize training for Caltrans Maintenance personnel. The Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center executed an IRB-approved human subject research process utilizing a CM Labs Vortex Edge Pro Desktop Simulator across several UC Davis and Caltrans locations. Quantitative results, including training effectiveness ratios (TER) and material removal rates (MRR), were analyzed alongside qualitative participant survey data. The data confirmed that simulator training accelerates operational competency, as trainees with prior simulator experience achieved higher MRR during on-iron operations. Ultimately, the AHMCT team used their findings to guide recommendations on how Caltrans can streamline their current training configuration to maximize efficiency.		
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