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Extension-ladder safety: Solutions and knowledge gaps

H. Hsiao ^a ... J. Weeks ^b

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Abstract

Falls from ladders are the second leading cause for work-related fatalities in the US construction industry. A significant portion of these incidents occurs at building-construction-and-maintenance worksites during the use of extension ladders. This paper presents the results of a critical literature review related to: (1) risk factors associated with falls from extension ladders, (2) practical engineering solutions that may reduce fall-from-extension-ladder incidents, and (3) questions pertaining to ladder safety that remain unanswered. The review results show that the underlying causes of falls involving extension ladders include the ladder-base slipping out, ladders tipping, workers slipping while on ladders or transitioning from a ladder to a surface at height, and mechanical failures. Some engineering control measures are available in the literature; yet, significant knowledge gaps remain. The knowledge-gap analysis identified four actions needed to advance ladder-safety practice: (1) research on visual indicators to assist in setting up ladders at the correct angle, (2) developing and evaluating measures to ease the transition from a ladder to a surface at height, (3) integrating ladder accessories into a

transition from a ladder to a surface at heights, (3) integrating ladder accessories into a convertible design to ease the carrying, assembling, and storing of multiple accessories, and thus to encourage safe practices, and (4) developing a graphic-oriented practical guide for safe ladder use, maintenance, and mechanical-flaw detection.

Relevance to industry

This paper identified knowledge gaps associated with extension-ladder use for advancing ladder-safety interventions. The development and evaluation of ladder-safety innovations will provide the necessary feedback to ladder manufacturers and ladder-standard-setting bodies for design enhancement and will provide workers practical solutions to reduce injury risks associated with extension-ladder use.



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Keywords

Construction; Accessory; Fall prevention; Slip; Ladder

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