

Improved stepladder design may decrease injuries

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Stepladders, a household product used by thousands of people every day, are a surprisingly common cause of injury. In 2009, more than 187,000 Americans visited the hospital after sustaining stepladder injuries, many of which resulted from a fall. A recent human factors/ergonomics study explores how improved design and user behavior can decrease the likelihood of future accidents.

In their upcoming HFES 55th Annual Meeting presentation, "The Role of Human [Balance](#) in Stepladder Accidents," HF/E researchers Daniel Tichon, Lowell Baker, and Irving Ojalvo review research regarding loss of balance and describe possible solutions to stepladder hazards.

Compared with a flat surface, stepladders present a smaller and less rigid surface on which to stand, and the narrow steps make it easier for a person to lose his or her balance. While standing on a stepladder, users may not be able to take a step to regain their balance or grab something to steady themselves, particularly while holding tools or other objects.

"In order to most effectively improve the safety of ladders, the causation of accident needs to be analyzed and better understood," Baker says. "In many of the cases we have investigated, the claimed cause of ladder accidents is that the person 'just lost their balance,' or 'just fell.' This raises several questions, including what factors cause someone to lose his or her balance in general, how a fall from a ladder can be precipitated by disturbances that would not lead to a fall for a person standing on the ground, and how ladders can be designed and used to minimize the risk

of a fall."

The authors believe that both designers and users can make a number of changes to reduce injuries. For example, the ladder could be more rigid to provide a stable work platform, which could offset human [balance problems](#). Front and rear rails could be manufactured with closed tubular sections and with cross-shaped spreader bars.

Users should be warned to avoid excessively reaching or looking above their heads while standing on a too-small stepladder, as this can cause them to sway and lose their balance. The person's age can exacerbate this, as older users cannot reach as far or maintain balance as well as younger ones. Using a taller ladder can mitigate this added risk and also provides something stable to grip. Choice of footwear makes a difference; shoes with thin, hard soles can improve balance and stability.

Provided by Human Factors and Ergonomics Society

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