

Safety at Height

A Holistic View of Fall Management



Natarajan Krishnamurthy



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Safety at Height

Everybody climbs up or down for some reason or other. Many fall and get injured or, worse, end up killed all over the world, especially in their place of work. Why does it happen? Does it have to be so? Can it be managed better and, if so, how? This book addresses these questions in layman's language, yet with sufficient technical detail to satisfy the more curious and challenge the more ambitious.

In *Safety at Height: A Holistic View of Fall Management*, veteran author Natarajan Krishnamurthy shares his long research and consultancy experience on this subject to offer an overview of falls, methods to manage them, and practical techniques to ensure better safety. This book argues that deaths and major injuries from fall accidents can be prevented by stakeholders knowing more and following guidelines. It looks at the mechanics of falls, accidents in the workplace, and safeguards that can be put in place. Featuring exercises at the end of chapters to underpin learning, this title concludes with unusual fall situations. Through its pages, the reader will develop a good understanding of how to prevent falls across a variety of different real-life scenarios.

This handy guide will be an ideal read for students, researchers, and professionals in occupational safety and health, human factors, and activities where slips, trips, and falls tend to occur.

Natarajan Krishnamurthy ('Prof Krishna') is an international consultant in safety, structures, and computer applications. Now based in Singapore, he has had significant roles in teaching and training, research and consultancy, in India, the USA, and Singapore, underpinning the breadth and depth of his experience. He has authored more than 100 papers and 18 books in his technical specialties and general fields. He has three inventions patented in Singapore.

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Dedicated –

To those who love heights, to help them be safe or get safer;

To those who fear heights, to lead them to safe management;

and

To those who don't care, to woo them toward greater heights.



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Preface

Any human activity at height has fascinated me throughout my adult life for three reasons.

-1-

As an engineering student in India in the 1950s, while on a technical education tour to an iron-ore mining facility, my group was trudging wearily up the hill to the control station of the ropeway for the ore buckets transporting the mined ore from the top of the hill to the bottom, arguing how it would be like to ride to the top in one of the empty buckets. Before I knew it, I had accepted the dare to show it could be done!

I climbed the nearly 15 m (50 ft) high tower, lowered myself into one of the slow-moving buckets, squatted within it, and started enjoying the panoramic view around me, trading jokes with my foot-sore classmates.

At high noon, the ropeway stopped for the workers' lunch break, with my bucket hanging midway between two towers!

When guards on their rounds saw me high up in the air, they got into a frenzy and mobilised my rescue. I discovered the reason for their panic as soon as they shouted that I must hold tight to the bucket sides, as otherwise, if I accidentally tripped the latch (yes, I saw it right then!) that held the bucket upright and automatically flipped it upside down to empty it when it reached the bottom, I would have fallen to my death, literally kicking the bucket!

Well, after my slow journey to the top, a tongue-lashing and a formal complaint there, all of us returned home. I was given a verbal thrashing by the college principal and my family elders. The only reason I was not dismissed from college was that I was a top scorer.

I have frequently wondered how I never felt any fear or anxiety while doing it. Certainly, it was because I had not known about the latch that would have meant my death by one false move. Also, climbing trees and boarding running buses were part of every normal youngster's repertoire in my time. But basically, I seemed to have no fear of heights.

Now that I have spent decades learning and teaching risk management, I have realised how stupid of me it was to have accepted the challenge without considering the risk of falling from that height. I shudder every time I think how close I had come to killing myself and ruining the futures of my dependants.

I have been so embarrassed, even ashamed, about this escapade that I have avoided mentioning it or responding to queries about it.

But I confess it now, to explain my inborn fascination with heights, to share my learning first-hand the dangers of moving to and at heights, and to warn wannabe superheroes to think twice before they take any such risk, about whether they or their loved ones, or their employers, can afford the consequences if something goes wrong!

-2-

The second reason is more professional.

In the USA in the 1970s and 1980s, when I worked on structural failure investigations, some of the actions involved climbing heights on ladders and scaffolds. I would

follow the lead of my American colleagues in the climbing, as of course they were more experienced in that work.

Even then, I did not think twice about what the risks were, because at the back of my mind was the faith that if my colleagues could do it, it should be safe enough for me to do it too!

But I gradually saw the logic of the safety measures my companions used during these inspections, such as the ‘three-point’ rule for climbing ladders. The Occupational Safety and Health Administration (OSHA) too had just started prescribing safety rules, and so my learning curve was fast and smooth.

Moreover, the years I spent in the USA also demonstrated to me how much Westerners loved rock climbing and other sports involving heights, and how seriously they planned and trained for them.

Those were my apprenticing years at workplace heights.

-3-

The third reason is the clincher, you may say, my main motivation!

When I got into workplace safety and risk management in Singapore more than two decades ago, mostly focusing on the construction industry, I had the opportunity to climb scaffolds and formwork fully conforming to safety regulations and to offer training courses for supervisors and other safety personnel on the hazards of working at height and their control.

In due course, I was invited to investigate accidents of falling from height and I also carried out personal study and sponsored research into working safely at height.

Soon, the problems of working at height and the many errors of omission and commission that led to accidents, the many human factors contributing to the root causes for falls, and the feasible solutions to these problems fascinated me to the extent that the topic became a passion, a crusade, and a mission for the rest of my life.

These three experiences have goaded me into studying more and sharing more of what I learnt from and with fellow engineers. I have conducted hundreds of short courses, made numerous seminar presentations, and published many papers on the subject since 2000 in Singapore, the USA, and India.

I have also patented an invention of a wheelchair modification that would eliminate the falling risk of old or sick or physically challenged users if they chose to get up and walk on their own.

This book is thus a logical outcome of my intent to share my knowledge and opinions on this vital subject.

All over the world, people keep falling all the time from heights, and even at level, for various reasons; many even die or get seriously injured from these falls.

While some of these mishaps may be attributed to unavoidable causes like slipping unexpectedly on a wet surface or ignorantly traversing an unguarded walkway, most of the ‘accidents’ could have been avoided by proactive planning and proper follow through.

In the following pages, I plan to discuss what happens when someone falls from height or at level and present my views on how to control or manage them. *A la*

Newton, I certainly stand on the shoulders of giants in offering such information and comment.

I shall refrain from the following:

- Invoke Government or Industry Regulations or Codes of Practice as my recommendation;
- Refer to any specific group or organisation as fully endorsed by me or being contrary to my thinking; or
- Include data or mention specific findings from any of my sponsored research not in the public domain, to support my recommendations.

I do this not only to keep this book above controversy or even any appearance of bias, but also because I intend to approach the entire problem of working safely at height holistically, in the sense of addressing the overall and entire ('whole') situation, rather than proffer specific recommendations based on rules.

My aim will be fulfilled if the book is useful to the reader in understanding the complicated subject and putting the knowledge gained to some practical use, or at least if the casual reader enjoys the general and descriptive portions if not the technical and the prescriptive!

N. Krishnamurthy
January 2024

At the very last minute, just before the book went into press, I decided to take the bold step of going public with the only proof extant of my fateful escapade, on Monday, 17 December 1957 (more than sixty-six years ago!), namely the photograph taken around 11 am, by my close friend and classmate Mr. B.V. Seenivasa Murthy, of me sitting in the bucket, calmly waving to him, while the other four in the group nervously stand by, worried about their part in provoking my rash and irresponsible act. Little did I know then that if I had jiggled around a little more in my perch, I would have fallen, to my death!





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