

Dropped Objects Handbook

# The Ultimate Guide to Dropped Object Prevention

Issue 02



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# What is a dropped object?

There are the two types of falling objects:

## Static

### Static Dropped Object

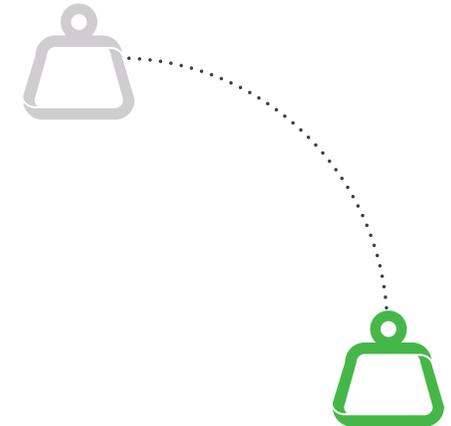
Any object that falls from its previous position under its own weight (gravity) without any applied force. For example, failure caused by corrosion or vibration.



## Dynamic

### Dynamic Dropped Object

Any object that falls from its previous position due to an applied force. For example, collisions involving moving equipment or loads, snagging on machinery or stacked items, dislodged tools or equipment.



# Dropped object statistics



## Did you know?

On average, nearly 140 people are 'Struck By A Falling Object' every day in the US

Source: OSHA

## United States

 × 255 Fatalities caused by a falling object in 2016

Source:  
[U.S. Bureau of Labor Statistics 2016](#)

On construction sites alone, there are an estimated 50,000 'struck by a falling object' incidents every year.  
Source: OSHA

## United Kingdom

The latest statistics from HSE's Riddor Report 2017/18 show that dropped objects still rank in the top 3 of the UK's workplace killers.

Falling objects also accounted for over 7,000 reported non-fatal injuries, with 75% of them resulting in over 7 days of lost work time each (2016/17).

Source:  
[HSE's Riddor Report](#)

## Australia

Between 2010 and 2014 falling objects in Australia caused:

- 125 fatalities (that's more than 'falls from height' for the same period!)
- 15,410 Serious Workers Compensations Claims [A serious claim is an accepted workers' compensation claim that involves one or more weeks away from work].

Source:  
[Safe Work Australia Traumatic Injury Fatalities, 2014](#)

Source:  
[National Data Set for Compensation-based Statistics, Safe Work Australia](#)

## Summary

- Even in developed economies, dropped objects are still one of the top causes of fatality.
- With the probability of an incident so high, why has the danger been overlooked for so long?
- Today, no one deserves to be exposed to the risk of falling tools at work.



Did you know?

**73%** of all dropped objects were classified as near hits in the offshore wind industry.

Source: G+ Global Offshore Wind Health and Safety Organisation

# The real cost of drops in the workplace

The costs of dropped objects can be divided into 3 main categories:

1

Time



Dropping tools and equipment has a huge negative impact on productivity. Often tools fall long distances, requiring considerable time to retrieve. If they fall into water, machinery or other 'non-retrievable' locations, it can delay or even prevent the task being completed on schedule.

2

Money



Dropping and losing tools costs money in terms of damage and replacement. The cost of retrieval in foreign material exclusion (FME) areas, like nuclear plants, can run into millions of dollars. Another important consideration is that, in the event of a dropped object incident, there can be lengthy legal implications and expensive bills to pay. If members of the public are involved, it can compound the problem and lead to other intangible costs, like brand and reputational damage.

3

Lives



Most importantly, of course, is the potential loss of life. Even with recoverable injuries, it is traumatic for the persons and families involved - it can lead to the loss of income and ongoing medical expenses. Remember, if you are working in public areas, it is not just your workforce at risk, but anyone passing nearby.

Any time an employee dies at work, it is a tragedy with high emotional and financial consequences.

# So, how much could just one dropped object incident cost you?



## Did you know?

According to the National Safety Council, 1 employee death costs 1.4 Million US Dollars

Source: National Safety Council, [Injury Facts, 2015 Edition](#)

## Don't forget

The cost of a workplace fatality extends far beyond the measurement of money.

The death of a colleague will have a deep emotional impact on the workforce. It can lead to numerous concerns, both internal and external to the company. Workers involved in the accident or employees who worked closely with the deceased co-worker can be affected psychologically. All of this impacts on team morale and productivity.

In reality, the true cost of every workplace fatality is incalculable.

## Summary

- There are 2 types of costs, direct and indirect. Direct costs include legal and medical expenses, whereas reputational damage and lost time are examples of indirect costs.
- Is the uncertainty of unlimited incident costs worth the risk?
- Tool tethering is like an insurance policy - for less than the cost of an incident, you can stop drops forever.

# Case Study: Dropped Tape Measure Causes Fatality

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Watch



A construction worker in New Jersey was working on a high-rise apartment complex some 400 feet above the ground when he dropped his tape measure. It plummeted over 50 floors before ricocheting off a piece of equipment.

And then...

It struck a delivery driver on the side of the head, knocking him unconscious. He was taken to Jersey City Medical Center, where he died shortly afterwards.

Cost and effect

This incident helps to illustrate the direct and indirect costs caused by one dropped tool accident. Despite the fact that this residential and hotel complex was a crucial project in Jersey's City's revitalisation campaign, a small hand tool caused irreparable damage and led to the suspension of one of the largest development projects in Jersey City's history.

One dropped tool accident cost a man his life - and irreversible loss to his family and community.

At the same time, the suspension of the project cost the main contractor an enormous amount of time and money spent trying to re-calibrate the project following the disaster. Following the accident, the main contractor was forced to contend with insurance costs, public relations, legal issues, and re-allocating and compensating the other contractors working on the suspended project.

Summary:

A dropped object accident

- Will leave you with irreparable damage - and what you can repair is going to cost a significant amount of money.
- Is one way to get media coverage, but probably not the sort your PR team strives for.

# What causes dropped objects?



## Did you know?

Almost half of all dropped object incidents can be attributed to human factors.

An understanding of the primary causes of the incidents can help conduct more thorough risk assessments by considering these during worksite hazard identification.

## Top 10

### 1. Inadequate Risk Assessment

Failure to identify dropped object hazards. A risk assessment can identify potential energy sources, index tools and equipment required for each task and increase worker awareness about the potential dangers of falling objects.

### 2. Human Factors

Operator error, poor behaviour, complacency, neglect. Inadequate training or awareness of hazards, operator error, complacency, neglect and poor reporting can result in compromised safety.

### 3. Inadequately Stored or Secured Tools and Equipment

No tool lanyards or tethers being used. No containment of loose items. Hand tools, power tools, mobile phones, even Personal Protective Equipment (PPE) are all examples of equipment and tools that should be securely tethered with tool lanyards.

### 4. Inadequate Procedures

Bad planning, no management of change. As with risk assessments, if the management of change process isn't in place to identify and control risk from the changes occurring in the workplace, unidentified and new risks may be missed.

### 5. Failed Fixtures and Fittings

Corrosion, vibration, poor design, selection or improper installation. Failed fixtures and fittings can and will often dislodge and fall. Regular inspection helps monitor any deterioration so that appropriate measures can be taken.

### 6. Poor Housekeeping

Pre-existing hazards from previous tasks. Workplaces and toolkits should be kept organised and tidy. Loose tools and equipment left around pose an unexpected risk to other workers.



Did you know?

Dropped objects are consistently the third most frequent cause of fatality and serious injury in the Oil and Gas Industry.

Source: DROPS

# What causes dropped objects? *Continued...*

## Top 10 - *Continued*

### 7. Collisions and Snagging

Lifting, travelling equipment, tag lines, service loops. Moving equipment, lifting and tag lines can all cause snagging or collision. The impact of collisions can cause breakage or create other dropped objects and debris.

### 8. Inadequate Inspection, Repair and Maintenance

Ignoring unsafe conditions. Regular inspections and maintenance repair schedules can help identify corrosion, damages, wear and tear to equipment and structural elements before they become a falling object risk.

### 9. Redundant, Neglected and Home-made

#### Tools and Equipment

These should be eliminated. Home-made tools, improvised tool tethers, equipment that is uncertified, or even damaged tools that have been subjected to a previous fall can fail or break unexpectedly. Tools, equipment and tethering gear should always be inspected before use.

### 10. Environmental Factors

Wind, sea motion, ice, snow, extreme conditions. The effects of these elements are more pronounced in exposed areas, such as working at height on oil rigs, and can compromise the stability of equipment, tools and structural features.

## Summary

- Human factors are responsible for nearly half of all dropped objects.
- Stopping drops requires a proactive and informed approach.
- Drop prevention training raises team awareness and encourages a collaborative approach.

# Physics of falling objects



## Did you know?

A 2kg hammer dropped just 5 metres will have an impact force of over 1 Tonne. That's like an elephant!

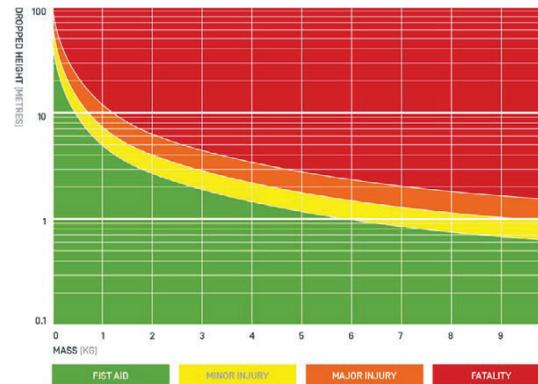


People often don't realise the impact forces that are generated when an object is dropped.

Even with some form of protection, the result of being struck by an item of relatively low weight can be significant.

## Dropped Object Calculator

This calculator helps measure the potential consequences of a falling object and is a very useful tool during the risk assessment process.



## Considerations

- With light objects (<0.1 kg) a key influencing factor is the effect of an object puncturing the skin and damaging tissue/internal organs. The calculator assumes a blunt object, so is not compatible with broken glass, metal shards etc.
- The wearing of standard PPE, eg hard hat, safety boots and eye protection, is assumed in the calculator.
- Do not subtract the height of an individual. Measure the complete fall distance to the ground.
- This dropped object calculator tool is a guide only, providing a cursory indication of the possible outcome.

# Physics of falling objects

## Watch



## Deflections

There are 2 primary types of incidents:

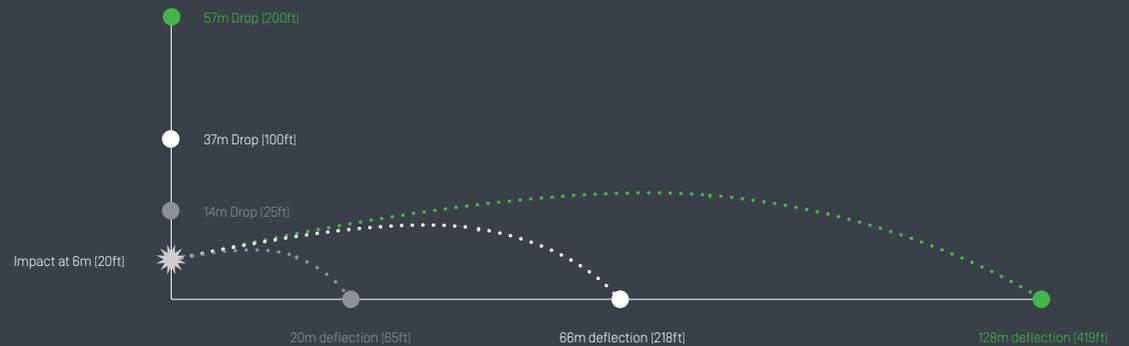
1. Direct impact
2. Deflection

Gravity as a force does all it can to make dropped items fall vertically. But, life isn't always straightforward. Dropped objects often have their vertical path obstructed, causing the tool to be deflected. This turns the dropped object into a projectile.

You can see the effects of this in the NLG dropped object safety explainer video.

## Summary

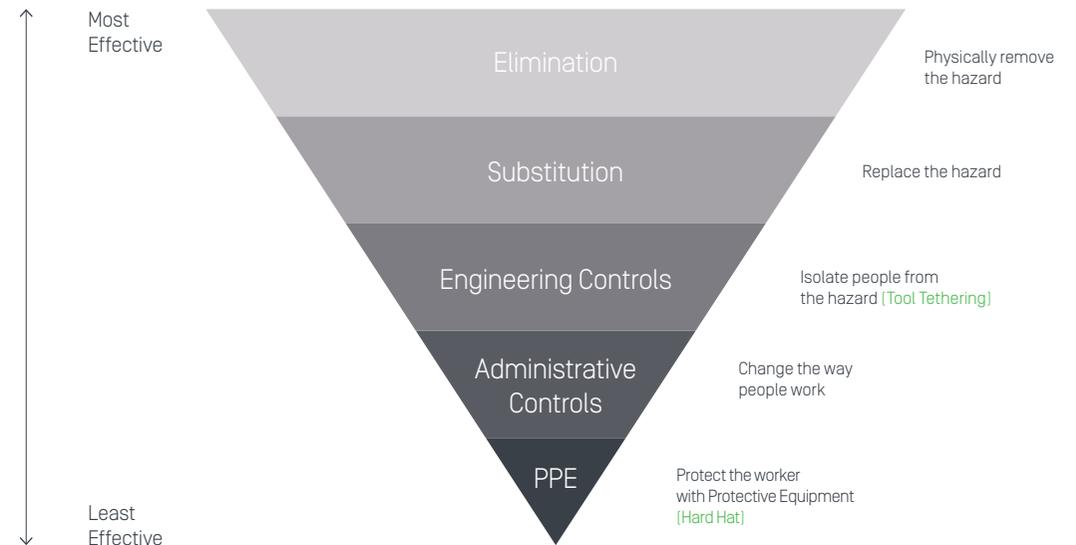
- Dropped objects quickly build up a significant impact force - and remember, if they strike a person they don't always just bounce off, they can penetrate soft tissue with disastrous consequences.
- A safe exclusion zone, that allows enough range for deflections, is rarely practical.
- With tool lanyards, dropped tools can be safely caught before any impact



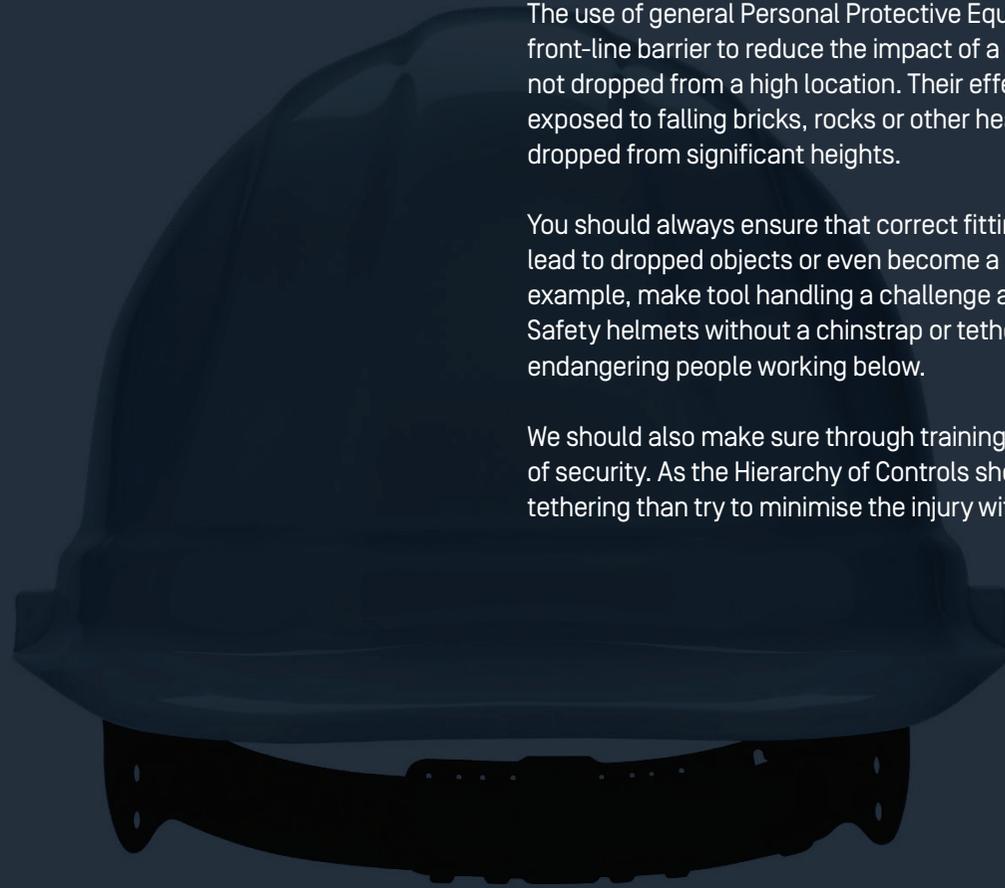
# The hierarchy of controls

Under the Hierarchy of Control, managing risk out is considered to be the best approach to prevent injury. Engineering a hazard out altogether or utilising alternative means of access to minimise fall risks would always be considered best practice.

Wherever possible, preventing the fall of a person or tools through the use of barriers, containment and tool tethering is the most appropriate means of protection possible. It removes the risk of people or objects falling in the first place.



## Role of PPE



The use of general Personal Protective Equipment (e.g. hard hats) can be a good front-line barrier to reduce the impact of a dropped object if it is relatively light and not dropped from a high location. Their effectiveness is, however, limited when exposed to falling bricks, rocks or other heavy items such as hand tools when dropped from significant heights.

You should always ensure that correct fitting PPE is used, because a poor fit can lead to dropped objects or even become a dropped item itself. Ill-fitting gloves, for example, make tool handling a challenge and can lead to the tool being dropped. Safety helmets without a chinstrap or tether, risk becoming a dropped object and endangering people working below.

We should also make sure through training that PPE doesn't provide a false sense of security. As the Hierarchy of Controls shows, it is better to stop the drop with tool tethering than try to minimise the injury with Personal Protective Equipment alone.

# Methods of containment

Here are some examples of how to prevent or reduce the risk of objects falling:

## Tool Tethering System



Tool tethering is the process of connecting a tool securely to an anchor or fixed point by using a tool lanyard. If the tool is dropped while working at height, it is prevented from falling and causing injury to workers or damage to property below.

[Learn more](#)

## Toeboards / Handrails



Toeboards and handrails should be fixed on scaffolding, platforms and walkways. By using additional closed mesh solutions, plywoods or other solid surface materials, coverage can be provided for all the gaps through which items can potentially fall.

## Netting



Utilise safety mesh or rated barrier netting (with debris lining) in areas outside walkways and underneath conveyors, walkways, platforms and along building/structure perimeters to prevent the drop of materials to a lower level.

## Working Platforms



When possible, lower the working platform to the ground. Perform all work on a structure at ground level and then lift it into position once complete rather than taking the tools and equipment to height.

## Training



Provide worker education on the risks and outcomes of dropped objects and provide them with the means by which they can minimise that risk.

## Summary

- Mitigating controls can help contribute to a broader dropped object prevention program.
- Preventative controls, like tool lanyards, will always be the most effective way to reduce incidents.

## Prevention vs. mitigation

There are many ways to prevent or reduce the risk of objects falling.

These include toe boards, handrails, netting and hard hats - these examples are all considered to be secondary defence (sometimes called mitigating controls). They are really a 'back up' system for when an object has been dropped and are designed to catch it or reduce the impact after the drop.

Tool tethering is a primary system (or preventative control) as it is designed to stop the drop in the first place. Today, proactive Health and Safety Officers across the globe are adopting this methodology and introducing tool tethering policies to stop drops before they happen.

# Training

## Killer on the Loose



A great way to start raising awareness is with videos. It's a powerful way to kick things off. Try using our [Killer on the Loose video](#) at your next safety meeting to start a discussion about dropped tools and objects.

# Training

## Toolbox Talks

A dropped object toolbox talk can help launch a program or refocus workers' attention on tool safety. Whether it's classroom style or online, here are some typical course objectives:

- Understand and define what is a potential dropped object
- Know how to identify a potential dropped object and the causes
- Review methods for the control and prevention of potential dropped objects
- Understand roles and responsibilities in respect of potential dropped objects
- Consider options for maintaining awareness and continuous improvement in the fight against gravity

# NLG Safety Academy



Having your team onboard is crucial to a successful program. Don't leave it to chance. NLG will support you with a structured plan so you can train and test your team's understanding at every level.

By building on the best practices of DROPS and collaborating with other industry leaders, NLG has established one of the most trusted dropped object prevention training programmes.

With NLG's simple training, you can grow your team's understanding and award them with Approved Safety Academy certificates for successfully completing each course.

Now you can be confident that everyone is onboard and competent.

## Summary

- If training is conducted in the correct manner, it will streamline the entire implementation process.
- Your workforce is worthy of the investment and will give their support for the project when the risks and objectives are clearly understood.
- Contribute to your team's professional development and build a strong culture around drop prevention.

# Dropped object prevention plan



## Expert tip

Take care when evaluating drop prevention devices.

Tool tethering should never inhibit the correct use of the tool.

## Never Let Go®

[neverletgo.com](http://neverletgo.com)

The challenges of implementing a tool drop prevention policy can be daunting. Right?

Understanding your legal requirements, digging into the facts and figures in your industry, presenting the case to the board, detailing your tool inventory, trying to find the right solution, rolling out a training program, not to mention handling negative feedback from disillusioned users.

You're not alone.

In fact, we find a common thread of challenges that face Health & Safety leaders today. Here are 5 of the most common concerns:

### Awareness

So many workers have been consistently exposed the risk of falling objects. This can lead to some inertia and give way to an attitude of complacency whilst ignoring the management of objects at heights.

### Culture

Whilst PPE generally can be interpreted as protecting ourselves, tool drop prevention requires a different perspective. It's really about protecting our co-workers. Changing perspectives and getting support for a new initiative could be stressful.

### Productivity

It is frequently considered that tethering tools would lead to restricted tool functionality and therefore lower output. In turn, workers would be frustrated and job satisfaction decrease.

### Variety

How can one tool tethering system compass the vast range of tools used by different trades at height on my site? If there isn't an answer to every question (or an option for bespoke products to my exact requirements), how will the project be sustainable?

### Management

Enforcement of a consistent tool lanyard standard could be difficult, particularly when subcontractors are involved. Once implemented, there could be additional responsibilities and pressure on the already busy inspection teams.

We understand. It's easy to feel this way.

At NLG, we've helped hundreds of other companies avoid these challenges and guide them through the same process.