

# Health and Safety Benefits of Modern Methods of Construction (MMC)



# Health and Safety Benefits of Modern Methods of Construction

Industry experts often refer to the health and safety benefits that accompany the decision to deliver a project using modern methods of construction. However, little tangible data has been recorded to support this claim. We have investigated further in order to understand how these health and safety benefits are achieved.

In order to quantify the expected benefits, we have utilised HSE statistics from the manufacturing industry as a tool for comparing on-site construction to the expected change to off-site construction. Although not a perfect match it is the most reliable data from which to draw conclusions as to how a move to offsite construction would impact health and safety statistics.

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## Risk management techniques

Dealing with risks is an everyday part of construction. The four main risk management techniques are avoidance, mitigation, transfer and acceptance. Depending on the risk presented the solution will differ in order to best deal with the situation at hand. We have analysed some common site issues and highlighted the potential impact of offsite manufacture and how it helps to reduce the number of injuries.

RISK DESCRIPTION	AVOID, MITIGATE, TRANSFER OR ACCEPT	OFFSITE MANUFACTURE IMPLICATION	IMPACT ON INJURIES
Quantum of site labour	Avoid/Transfer	A switch to offsite production will reduce the total number of workers required and instead utilise more mechanical equipment which would instantly reduce the number of accidents. For example, if a traditional process on a construction site required	More efficient production with less people will instantly reduce the number of fatalities and injuries. Further benefits will be ascertained from the switch to a manufacturing environment
Vehicle movements	Mitigated/Transfer	Reduced number of vehicle movements on site	Reduction in collisions due to less vehicles on site and move vehicle movement in a controlled environment
Quantity of site activities	Mitigated	The number of low skilled site activities is heavily reduced or even eliminated and replaced by highly complex and skilled activities	Less injuries due to less labour required and the removal from site of unskilled labour
Working at Height	Avoid/Mitigate	All working at height would be removed where possible	As a leading cause of 50% of the deaths in construction, the removal of working at height would be pivotal
Temporary works	Avoid	Temporary works would no longer be required,	Without short term impacts of temporary works there is more time to plan work. Short term changes to site logistics which can cause confusion. Without temporary works
Material movements	Mitigate/Transfer	Many materials would be required in the offsite production facilities, thereby being diverted from site until they were finished products	Less materials would lead to fewer vehicle movements and less manual handling on site which are both major causes of accidents in construction
Repetitive tasks	Transfer	These tasks are some of the first to be transferred offsite as they are best carried out in a controlled environment	Automating some of these processes removes the requirement for manual labour which would ensure no accidents are carried out as a result of these tasks
Onsite assembly activities	Transfer	These works could be carried out in a production facility where they could be planned in detail and better controlled	Moving activities off site and using volumetric construction would drastically reduce the number of people required on site and would therefore help to reduce the number accidents that occur on site
RAMS	Transfer	There is more time to plan works and the operatives are specialised in their field of assembly	By having specialists in their field carry out every aspect of a project, you reduce the risk of accidents because the workforce is high trained
Assembly of components	Transfer	Components are assembled in a controlled production environment	Skilled workforce is trained. The production facility ensures safe walkways are demarcated and permanent which all assists in ensuring there are no injuries. Would the repetitive nature of work increase other types of injury
Training	Mitigate/Transfer	Operatives receive greater training than the operatives on site	Additional training reduces the risk of accidents
Access and Maintenance issues	Avoid	Operational maintenance issues i.e. access can be designed into the building	By thinking about maintenance during design you can make sure access is safe and all mechanical and electrical plant and equipment is easily accessible which reduces the chance of injury on the maintenance team

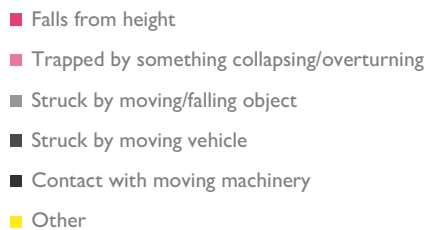
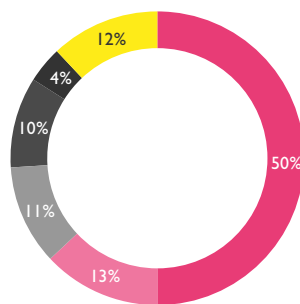
## Fatalities

One of the most profound affects to health and safety by utilising modern methods of construction would be an expected decrease in the number of deaths attributable to construction activities.

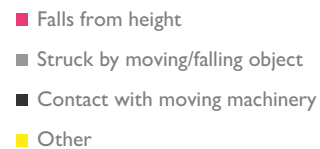
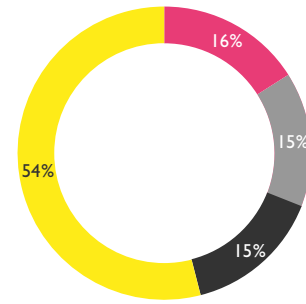
The fatal injury rate in construction currently stands at 1.62 per 100,000 workers which is approximately four times the average for all industries (currently at 0.42 per 100,000 workers). In the manufacturing sector, the fatality rate is 0.65 per 100,000 workers. Shifting as much production offsite will remove risks which are inherent with construction and which have long resulted in serious injury and death.

Below we have populated two tables which group the cause of death in both the construction and manufacturing sectors in order to identify any potential benefits.

Construction fatalities by cause



Manufacturing fatalities by cause



## How will the implementation of modern methods of construction result in fewer deaths?

As shown in the graphs opposite, 50% of all deaths in construction are attributed to falls from height. Offsite production will remove many of the requirements to work at height therefore eliminating one of the main causes of death to construction workers. This risk is not eliminated but significantly reduced and can be better managed/controlled in a factory environment.

Switching to offsite construction may result in a reduction in deaths in other descriptors. By moving as much of the production offsite as possible you need less people on site and the ones remaining are often highly skilled. Production facilities have better segregation between machinery and people which removes another main risk of fatality and leads to less vehicles on construction sites site.

Modern methods of construction although unlikely to eradicate deaths would have a significant impact on reducing the number of deaths and making the construction industry safer.

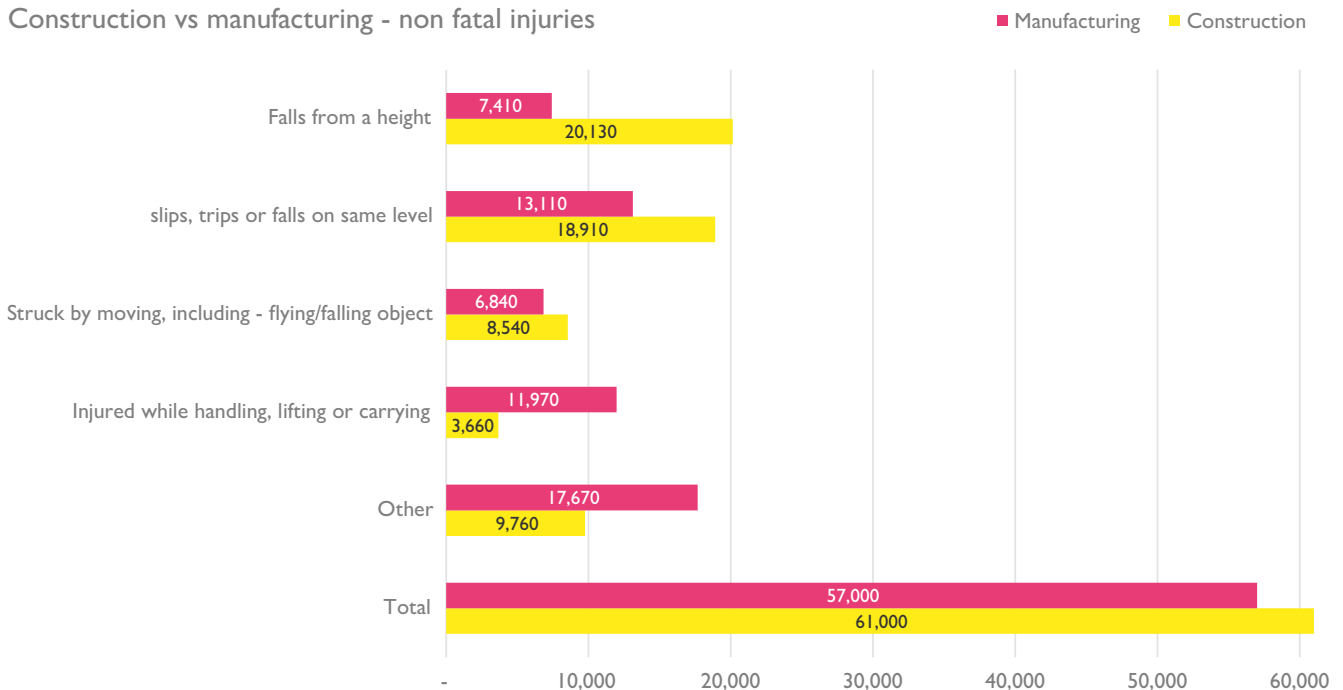
## Non-fatal injuries

Whilst the number of incidents per year at 61,000 in construction and 57,000 in manufacturing are broadly similar, the manufacturing industry employs 33% more people than construction. In order to ensure the industries are comparable you must instead look at the number of injuries per 100,000 workers as per the table below.

INDUSTRY	INJURY RATE PER 100,000 WORKERS
All industry average	1,680 per 100,000 workers
Manufacturing	2,020 per 100,000 workers
Construction	2,870 per 100,000 workers

As shown above, you are far more likely to suffer an injury in the construction sector. In order to identify where an improvement may be made by moving traditional construction activity to an offsite location, we have compared how the injuries have been occurring in each industry below.

### Construction vs manufacturing - non fatal injuries



Implementing modern methods of construction will also result in a reduction in non-fatal injuries. It is an achievable reduction for the construction sector through the implementation of modern methods of construction.

## How will offsite manufacturing reduce the number of non-fatal injuries?

Based on the non-fatal injury rates per 100,000 workers shown above, in theory there should be a reduction or roughly 42% simply by moving construction activities offsite. By designing out and placing the high-risk trades into an offsite factory environment which can be better managed and controlled or even automated the activity is immediately reduced in risk of causing an accident. Falls from height will reduce, lifting injuries would be reduced using mechanical equipment for lifting

There are clear health and safety benefit of moving construction activities offsite into a manufacturing environment. The change is likely to see an improvement to the existing statistics but there would still be work to do, to eradicate both non-fatal and fatal injuries from the workplace.

## Work related stress, depression or anxiety

Another area of health which requires consideration when looking to implement offsite manufacture is the impact on stress, depression or anxiety rates among employees.

This has highlighted a potential disadvantage of moving to offsite manufacture is the increase in stress, depression or anxiety that is work related. Construction is significantly below the industry average along with manufacturing. However, employees are likely to be an increased risk of work-related illnesses when activities of work transfer across using offsite construction as shown in the data below.

INDUSTRY	INJURY RATE PER 100,000 WORKERS
All industry average	1,780 per 100,000 workers
Manufacturing	1,220 per 100,000 workers
Construction	920 per 100,000 workers

## Commuting

The construction industry often sees workers travel long distances to work on a regular basis, with each trade only required on site for a matter of weeks. This results in a highly mobile workforce having to travel long distances for work. The Royal Society for public health (RSPH) estimated the average commute was 56 minutes but in construction amongst other industries it is often be much greater.

The detrimental impacts of a long commute were highlighted in a 2016 report by the RSPH as:

- 54% increase in stress levels
- 30% average increase in snacking and fast food consumption
- 44% reduced time with friends and family
- 40% reduction in physical activity
- 35% reduced time spent sleeping

Other research has concluded those people with a long commute are 33% more likely to suffer from depression, have a 21% increased chance of obesity and a 40% higher chance of divorce. Moving to modern methods of construction and offsite production would enable a fixed production facility to be setup which would significantly reduce commuting requirements as the workers are likely to live in the local vicinity

## Conclusion

Whilst there are clear tangible benefits of moving to offsite construction with regards to the decrease in the quantity of fatal and non-fatal injuries. There's also a reduction in commuting time for several workers, providing a positive impact on their physical and mental well-being. On the other hand, there is also an increased probability of work-related stress, anxiety or depression. Therefore, the implementation of modern methods of construction will have tangible benefits to health and safety but further improvement would still be required to ensure everyone gets home from works safely.