Dropsafe®

Drops Prevention Technology

EMPOWERING DROPS PREVENTION

A DROPSAFE HANDBOOK

Tackling human factors in Drops prevention

A SYSTEMATIC APPROACH TO MITIGATING DROPS RISKS CAUSED BY HUMAN FACTORS

This handbook shows that the best Drops prevention programmes take a systematic approach. Power generation facility managers can prevent or mitigate Drops risks using a variety of approaches. One key cause of Drops incidents worth analysing in greater depth is human factors.

In future, automating hazardous or repetitive tasks in power generation will start to eliminate the human element of the safety equation. For now, facility design, best practice equipment and robust procedures all play a part in reducing the impact of human factors.

The following chapter, with reference to Dropped Object Prevention Scheme (DROPS) best practice and guidance, explores the importance of considering human factors in Drops prevention, and places these within a wider context of power generation safety.

What are human factors in Drops prevention?

Anyone can make a mistake. When working at height, however, a mistake can lead to a Drops incident, with severe consequences for individuals and organisations. Rather than accepting mistakes as an unavoidable part of industrial operations, Drops prevention aims to reduce the scope for human factors and shift the emphasis away from individuals, and onto organisations.

Within the wider energy sector, the Human Performance Oil & Gas (HPOG) initiative brings together key stakeholders to identify and manage the way tasks are carried out in daily operations, and examine how this interacts with human factors.

HPOG defines human factors as “The range of physical, psychological, social or organisational influences which affect human performance and how people carry out their activities.

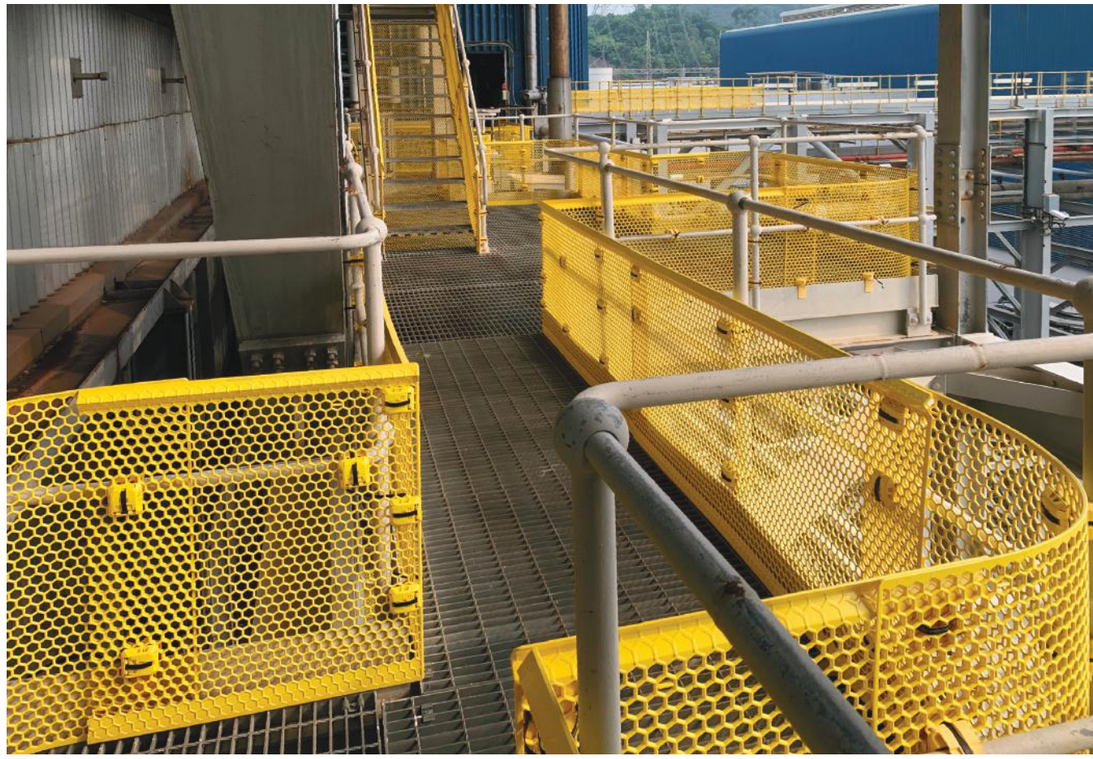
Crucially, HPOG recognises that tackling human factors involves “designing equipment, work environments and activities so that people find tasks easy to perform, safe and matched to their strengths and limitations. It is an approach which is integrated into risk management, engineering, procedure writing, job planning and training.”

To tackle this challenge, power generation HSE and facility managers can adopt this approach, and the tools it uses, into their own Drops prevention programmes.

How can human factors increase the risk of Drops incidents in power generation?

Inappropriate procedures, inadequate design, and inadequate maintenance are all major causes of Drops which ultimately aggravate human factors. Accordingly, a holistic approach to Drops prevention is needed to ensure that all the root causes of Drops are tackled together.

That said, human factors remain a key cause of Drops incidents. According to a forthcoming DROPS survey interim report, over a third of reported Drops incidents can be attributed to poor behaviour, operator error, planning or operational miscalculations, and not following procedures.



Below are some common examples of human factors which can contribute to increased Drops risk at a power generation facility – although this list is by no means exhaustive.

- Distractions in the working environment
- Overly complex procedures incentivising shortcuts
- Repetitive tasks leading to fatigue
- Not enough personnel assigned to a task
- Completing a task under time pressure
- Incorrect tools for the task
- Inadequate training
- Novel situations requiring improvisation
- Difficulties communicating

The examples above can be caused or exacerbated by long-term, or 'latent' conditions, or short-term, 'active' conditions. Latent conditions include poorly written procedures, repetitive manual handling and unclear roles & responsibilities.
Active conditions, in contrast, include poor shift planning, unreasonable deadlines, restrictive PPE, and an uncomfortable working environment.
The key to tackling both latent and active conditions is systematic planning with Drops prevention in mind, which minimises the space for misinterpretation, fatigue and improvisation.

'Work as imagined' versus 'work as done'

A key tool for understanding why tasks and procedures may sometimes create the conditions for Drops incidents to occur is the distinction between 'work as imagined' and 'work as done'.

HPOG defines work as imagined as "how engineers, planners, advisers, managers or anyone else involved in design believe the work should be done, under ideal circumstances."

'Work as done' is defined as "what people actually do to get the job done, taking into account the realities of the situation such as the equipment configuration, and ease of use of the procedure, and the time and resources they have."

When there is a significant gap between the two, personnel may have to adapt their behaviour. The overall goal for decision-makers is to ensure that 'work as imagined' is as close to 'work as done' as possible. Therefore, clear lines of communication within power generation organisations – especially where decisions are taken off-site or centrally – are crucial to mitigate conditions that raise the risk of Drops incidents.

Human factors Dropped Object case study: Falling piece of angle bar

The International Marine Contractors Association (IMCA) reported on a high potential near-miss Drops incident where a piece of angle bar fell 11m (36ft) Personnel and contractors were removing a platform, and assumed that contractors had cut the platform as the barricade tape had been removed.

A previously unnoticed piece of angle bar was cut off and placed on the scaffold floor. The person who had cut the bar subsequently kicked it off the scaffold accidently. Four personnel were below – the angle bar landed 1.5m (4ft 11in)away from them. If the object had struck one of them, it could have caused a fatality.

The operator found that the worker who performed the cutting task was not qualified for the procedure, and failed to remove the angle bar from the scaffold.

According to IMCA, to prevent future incidents from occurring, the operator took the following preventative measures:

- All loose materials should be removed from all high-level working platforms or relocated away from the edge of platform and properly secured.
- All areas underneath where work is taking place at height should be barriered off with hazard tape until overhead work is completed.
- A guard worker should be posted outside the hazardous dropped object zone prevent access.
- Only properly trained and competent workers can carry out the work.
- Before work at height starts, appropriate inspection of the worksite should take place by qualified personnel.

How can the impact of human factors in power generation be reduced?

Power generation facility managers and other key stakeholders can reduce the scope for human factors as a cause of Drops incidents by following the four steps below. These are:

1. Build a Drops prevention culture
2. Design facilities to remove Drops hazards
3. Use engineered controls to mitigate risk
4. Use administrative controls

1. Build a Drops prevention culture

Changing fixed attitudes and building a Drops prevention culture through all levels of an organisation is key to tackling human factors in power generation. It means that procedures can be designed and implemented more effectively, as decision-makers are more aware of how Drops risks affect daily operations.

To learn more about how to build a Drops prevention culture in power generation, please read 'Empowering Drops prevention: A Dropsafe Handbook, chapter two: The 'Fundamentals of Drops prevention best practice' here.

2. Design facilities to remove Drops hazards

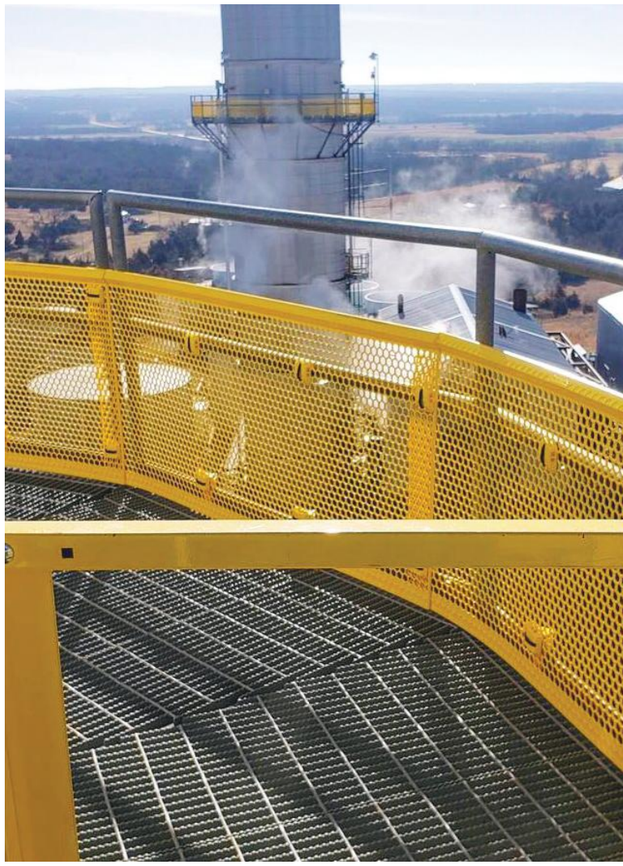
The first priority of the hierarchy of controls is designing out Drops risks from facilities, ensuring that human factors do not come into play. For more information about using the hierarchy of controls in power generation facilities, please refer to chapter two of the handbook at the previous link.

3. Use engineered controls to mitigate risk

Alongside other control mechanisms to mitigate Drops, there are engineered solutions available which aim to reduce the impact of Drops that occur due to human factors. This includes tool tethering solutions, safety securing solutions, and barrier systems.

For more information on best practice use of tool tethering solutions in power generation, please see chapter four of Empowering Drops prevention here.

For more information on how barrier systems can help to mitigate Drops in power generation as part of a systematic approach to Drops prevention, please read chapter three of the handbook here.



Power generation facility managers should ensure that the primary fixings are correctly installed and maintained. Appropriate secondary retention, such as washers, pins, locking nuts, are used to secure the primary fixing. Safety securing products act as a mitigation measure to respond to the remaining risk. For a detailed analysis of all engineering control measures, please refer to the DROPS Reliable Securing Handbook at this link.

4. Use administrative controls to tackle human factors

Taking a step back from daily operations to consider what safety benefits long-established working practices deliver can help facility managers understand where potential areas for improvement may exist.

Questions facility managers can ask may include:

- Are adequate breaks given beyond basic regulatory requirements?
- Are suitable employee health programmes in place?
- Is the facility signage up-to-date and supportive of Drops prevention best practice?

A useful tool developed by HPOG for understanding specific tasks is the Walk Through, Talk Through procedure. This aims to break down a task at a granular level to identify potential human factors and risks, helping decision makers to put appropriate administrative controls in place to mitigate Drops.

A free-to-use Walk Through, Talk Through template can be found at the end of this chapter. Please refer to this guide for more information on how to use the template.

As technology progresses and the ability to automate hazardous or repetitive tasks increases, human factors will steadily decrease as a cause of Drops in power generation. In the meantime, robust procedures, widespread Drops awareness and best practice Drops prevention solutions can help tackle the challenge.

Drops prevention guidance and additional resources are available free of charge at the DROPS website here.

DROPS are also able to provide bespoke Drops Awareness and Training programmes – sessions can be schedules through training@dropsonline.org

Sources:

Free industry resource from HPOG, DROPS and IMCA has supported the development of this chapter. Please see a list of references below.

HPOG Glossary:
https://www.hpog.org/resource-centre/glossary/

IMCA Safety Flash:
https://www.imca-int.com/safety-events/high-potential-near-miss-dropped-object/

DROPS Reliable Securing Handbook Revision 4:
https://www.dropsonline.org/resources-and-guidance/drops-reliable-securing-booklet-rev-04/

Walk Through, Talk Through Guidance:
https://www.hpog.org/assets/documents/WTTT-Guide-Leaflet-Rev01.pdf

Free DROPS resources:
https://www.dropsonline.org/resources-and-guidance/

Free HPOG resources:
https://www.hpog.org/resource-centre

FREE WALK THROUGH, TALK THROUGH TEMPLATE FROM HPOG

WHAT YOU NEED TO DO AS PART OF YOUR WTTT

- Conduct a Walk-Through / Talk-Through in the field / on the shop floor (where the task is done) with the Person who will be doing the job.
  You will aim to identify the key steps in a task, discuss what can go wrong with each step, and under what conditions mistakes are more likely. If possible, take photos of the task activities, tools, equipment, working environment etc.
- Document your WTTT in the template below. <delete blue text guidance when complete>
- Embed the photographs in the template below or append these as a picture book if possible.

Task Name:	Task Description:

Photos of Task Activities:

1. HAVE A CONVERSATION WITH THE PERSON DOING THE JOB TO PRIME YOUR WTTT

Have the individual talk about a time in the past when it was really challenging to complete this task. What made it difficult? What did they do to adapt? How did they know what to do?

What was the situation?	What made it difficult?	What did you do to adapt? How did you know what to do?	What are the most important learnings and corrective actions that we should adopt from that situation?

2. CONDUCT THE WTTT WITH THE PERSON DOING THE JOB

Walk through the activity and write down the steps (Literally walk through the task guided by person doing the job in the field (or wherever the task is conducted) OR if unable, paste the task steps from the procedure)	Jointly with the person doing the job, select 3 steps that may lead to most severe problems/ consequence? (e.g. injury, defect, time, cost, impact on production). Write down what the potential problem / consequence may be.	When walking through the steps, what makes a mistake more likely? What factors make the step more difficult to perform? What is it about this step that a new person could find confusing? (according to the person doing the job)	What can be done to remove / address error traps (according to a person doing the job)? Has the operator found better ways of completing the step?