



DROPS the guidelines

DROPPED OBJECTS PREVENTION SCHEME

Introduction

Over the years within the industry, it has been recognised that there has been a high number of incidents of dropped / falling objects within drilling derrick structures. The potential for this type of incident to severely injure personnel or cause material damage on the drillfloor and in the surrounding area is very high. In extreme cases, fatal injuries to personnel have resulted.

This situation cannot be tolerated and allowed to continue. Action requires to be taken to eliminate this type of incident from occurring. It is not just an operator's problem or a rig owner's problem; it is a **common problem** for anyone who uses a drilling derrick. It occurs within drilling derrick structures on fixed installations, mobile drilling units and land rigs. As such, the solution is not an individual one, but a **common solution** and should be one that can be utilised by **everyone** who is involved in working within and around a drilling derrick.



Objectives

This workpack is intended as a guide to eliminating the incidence of dropped objects from within drilling derrick structures. As such, the overall objectives of the DROPS model are:

- Eliminate injury to people.
- Eliminate the incidence of damage sustained in the derrick structure.
- Eliminate damage to other associated derrick equipment.

Strategy

OVERALL

The DROPS model, if followed closely, will reduce the number of dropped objects from within the drilling derrick structures. The principal actions required to successfully adopt the DROPS model, include:

- 1 Form a joint **workgroup** with the crews and sites involved, with identified Focal Points from each team at those rig sites.
- 2 Identify the **common problem areas**.
- 3 Develop an **action plan**.
- 4 Carry out and **monitor** the action plan.

WORKGROUP

The Dropped Objects Workgroup should be formed comprising, as a minimum, the following persons:

- An identified Chairman such as a Senior Manager (to give the workgroup support and management commitment).
- Identified Focal Point from each location / site within the relevant operator or drilling contractor rig-site team, ie Assistant Driller or Drilling Engineer.
- An HS&E Advisor.
- Focal Points or representatives from identified derrick main equipment manufacturers and suppliers.

The workgroup, once formed, should set out its Terms of Reference, agree the strategy to be followed, agree an action plan, commit to deliverables versus a time line and meet regularly to monitor progress and effectiveness of the action plan.

DROPPED OBJECT HAZARD ZONES

The Workgroup should identify areas or zones which have the potential to create a dropped object incident. These can be arrived at by analysing historical data such as incident reports, near miss reports, location drilling reports, reviewing operational procedures and data from Planned Maintenance Systems. The identified problem areas can be used to form the basis of a remedial action plan.

DEVELOP AN ACTION PLAN

The Action Plan should be developed to tackle identified problem areas. The following Action Plan is to be used as a model and adapted where necessary.

Step 1:	Awareness Campaign ▶
Step 2:	Action Plan ▶
Step 3:	Remedial Action ▶
Step 4:	Manufacturers and Suppliers ▶
Step 5:	Automated Derrick Systems ▶
Step 6:	Third Parties ▶
Step 7:	Operations ▶
Step 8:	Continuous Improvement •

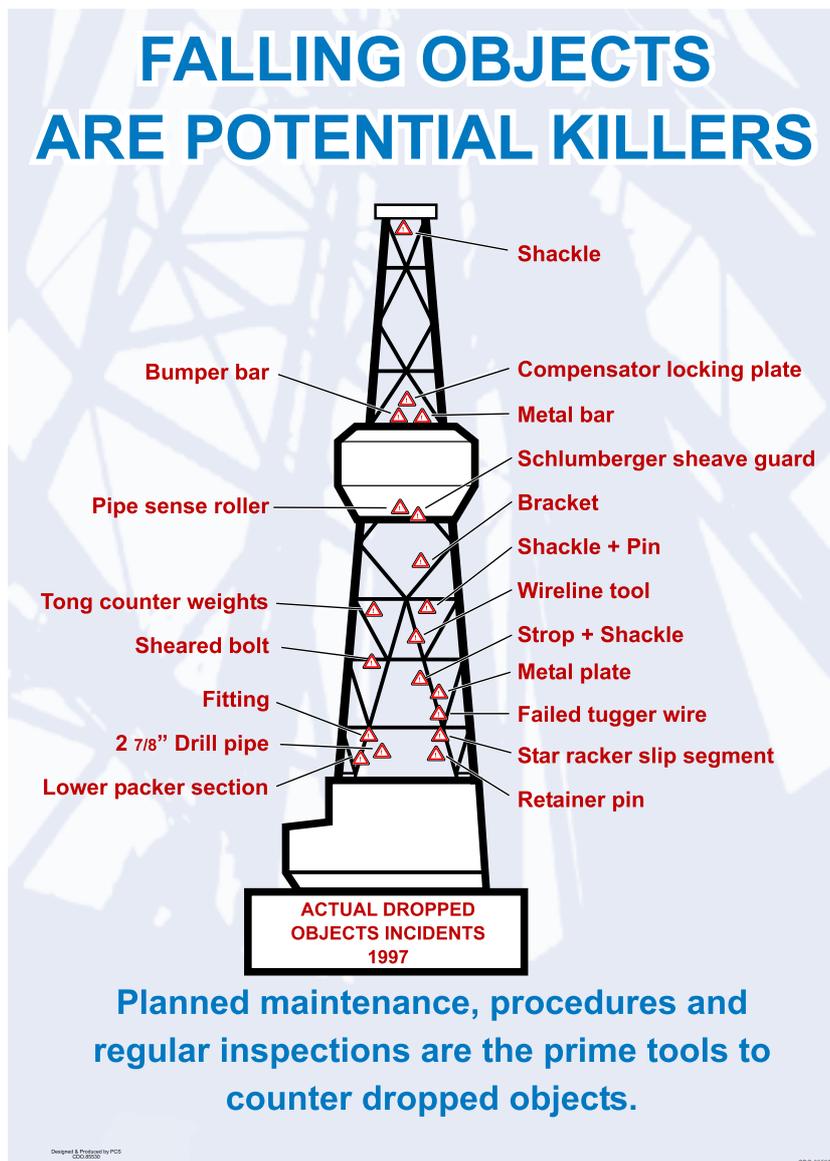


Step 1:

Awareness Campaign

Raise the awareness of and alert everyone as to the nature of the problem and the actual and potential consequences of dropped objects from within drilling derricks. This may be achieved by reviewing site specific incident reports for this type of event and highlighting the problem utilising a poster campaign, see example below, or the DROPS awareness CD ROM, see attached CD.

Conversations should be held with individuals and teams to raise awareness of the problems and its consequences and what has to be done to eliminate the problems.



Example Poster

Step 2:

Action Plan

IDENTIFY THE DERRICK ZONES

Divide the derrick into small manageable sections to help you define areas. There are no rules to determine these areas or the number of zones, however it should be logical and it may be helpful to select obvious physical boundaries to ensure areas are clearly understood and no equipment is overlooked from your analysis and inspection. See below for a typical zone layout.

Area 1: Crown and Water table

anemometer; crown sheave and pins; watertable snatch blocks; lighting

Area 2: Monkeyboard

bridge racker, standlift cylinder and drag chain; racking boards and air winch; top drive blower assembly derrick structure, including: derrickman's cabin, lighting, proximity switches, ladders, handrailing and grating

Area 3: Travelling Equipment

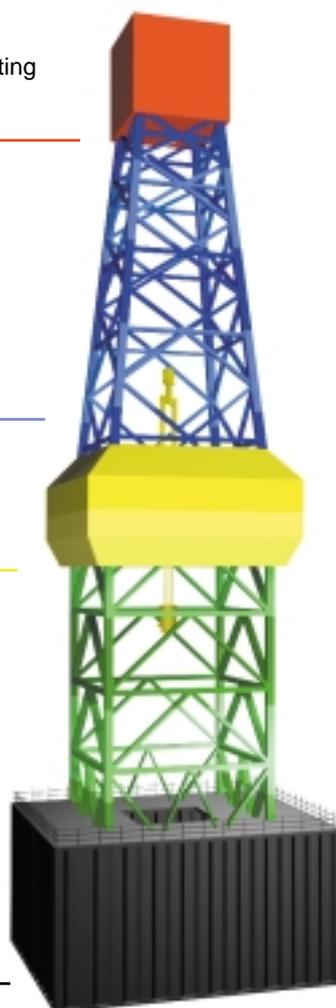
travelling block; top drive and pipehandler; retractable dolly assembly; rotary hoses; cementing head; wireline equipment; casing equipment

Area 4: Drill Floor and Mezzanine Deck

lower racking arm; iron roughneck; stabbing board; elevators; mezzanine storage area; vee door, cylinders and rollers

Area 5: Lower Substructure and BOP Deck

lower substructure, drawworks cooling package; BOP crane; BOP stacks



For each zone, adopt a colour coding scheme such as the one shown above. This makes identifying areas both simple and immediate throughout all communications / DROPS templates.

Important: The zones you define at this stage will be used throughout the DROPS model templates. As such, the templates presented in this document are based on the above 5 zones.



COMPILE AN INVENTORY OF EQUIPMENT

This inventory listing process will require considerable effort and commitment from various personnel and could take as long as three months to compile a complete list, depending on the available resources. However, members of the audit team should be intimately familiar with the derrick and workings of the equipment within. The time and effort spent initially compiling this list will be beneficial to all involved as it will indicate every item and its location within the drilling derrick structure. In addition, it should highlight an item which has a potential to drop.

The inventory can be completed by an individual, such as the Driller, or by a group, but again this will depend on the available resources. Throughout the whole process, guidance must be sought from the Rig Management Team, such as the Toolpusher or Rig Manager.

The example inventory presented in this guidance are limited to a few items per zone. The complete list should identify every potential dropped object on the derrick inventory and may run to hundreds of items.

Remember to customise the derrick inventory to your defined derrick zones.

INVENTORY OF MAJOR EQUIPMENT ITEMS

In addition to the inventory sheet, identify and list the major equipment items (for example, crown block, travelling block, compensator, top drive unit, pipe handling and racking systems, fingerboard) by manufacturer and model number. These more technical items of equipment will require a technical input from the manufacturers / suppliers into how they should be positioned and fastened. See the templates for a suggested format.

Remember to customise the major items according to your derrick inventory.

- 1 List each **item** and its location within the drilling derrick structure. Begin by mapping each zone and the equipment within it.

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna					
1.2	Degasser Ventline					
1.3	Padeye Bracket					
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover					
2.2	Electrical Junction Box					
2.3	½" steel airline					
Area 3 : Travelling Equipment						
3.1	Travelling Block					
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light					
4.2	Inertia reel & safety sling					
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light					



2 Identify the **fastening method** for each item (if applicable).

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna	Clamp				
1.2	Degasser Ventline	U-bolt				
1.3	Padeye Bracket	Welded				
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover	Welded Bracket				
2.2	Electrical Junction Box	Bolted				
2.3	1/2" steel airline	U-bolted				
Area 3 : Travelling Equipment						
3.1	Travelling Block	Bolts & Pins				
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light	Strip Light				
4.2	Inertia reel & safety sling	Shackled/ safety sling				
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light	Bolted / safety sling				

3 Record the **Tag number** (if applicable).

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna	Clamp	FD-01-18			
1.2	Degasser Ventline	U-bolt	FD-02-36			
1.3	Padeye Bracket	Welded	FD-09-02			
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover	Welded Bracket	FD-06-29			
2.2	Electrical Junction Box	Bolted	FD-06-61			
2.3	1/2" steel airline	U-bolted	FD-06-37			
Area 3 : Travelling Equipment						
3.1	Travelling Block	Bolts & Pins	FD-03-02			
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light	Strip Light	FD-05-69			
4.2	Inertia reel & safety sling	Shackled / safety sling	FD-04-56			
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light	Bolted / safety sling	FD-05-70			

4 Define each item as essential or non-essential by reviewing all derrick operations and procedures. This process should be carried out by the Rig Manager or Toolpusher.

5 Each item deemed non-essential or redundant should be analysed for any knock-on effect if removed. This review process of redundant equipment should be carried out by the Rig Management Team.

Remove all redundant equipment which will not impact on essential items.

To measure the success of this scheme, weigh all redundant material over a period of time and convey the cumulative total to the workforce. The amount can be alarming. The example shown in the photo (right) demonstrates the amount of redundant material found during a sweep of a jack-up rig after a dropped object incident. For mobile rigs it is important that the OIM or Barge Master is notified of all equipment, its weight and location within the derrick before it is removed so that the vessel's marine characteristics can be updated.





6 The next process is to identify the **risks** associated with the remaining essential items.

Based on good judgement and a comprehensive knowledge of the equipment, Rig Management should classify the risks in terms of likelihood and consequence to fail. The risks should be categorised as **Low, Medium or High**. The purpose of carrying out this risk assessment is to reduce the risk of a dropped object to As Low As Reasonably Practicable (ALARP). Regular inspections are a major part of risk mitigation. We address this in Step 3 'Remedial Actions'.

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna	Clamp	FD-01-18	Low		
1.2	Degasser Ventline	U-bolt	FD-02-36	Low		
1.3	Padeye Bracket	Welded	FD-09-02	Low		
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover	Welded Bracket	FD-06-29	Med		
2.2	Electrical Junction Box	Bolted	FD-06-61	Low		
2.3	1/2" steel airline	U-bolted	FD-06-37	Low		
Area 3 : Travelling Equipment						
3.1	Travelling Block	Bolts & Pins	FD-03-02	Med		
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light	Strip Light	FD-05-69	Low		
4.2	Inertia reel & safety sling	Shackled/ safety sling	FD-04-56	Low		
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light	Bolted / safety sling	FD-05-70	Low		

7 Record the **controls** and **standards** specific to each item.

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna	Clamp	FD-01-18	Low	Weekly Inspection	
1.2	Degasser Ventline	U-bolt	FD-02-36	Low	Weekly Inspection	
1.3	Padeye Bracket	Welded	FD-09-02	Low	6-monthly NDT/ MPI	
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover	Welded Bracket	FD-06-29	Med	Weekly Inspection	
2.2	Electrical Junction Box	Bolted	FD-06-61	Low	Monthly Maintenance Routine	
2.3	1/2" steel airline	U-bolted	FD-06-37	Low	Weekly Inspection	
Area 3 : Travelling Equipment						
3.1	Travelling Block	Bolts & Pins	FD-03-02	Med	Monthly Maintenance Routine	
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light	Strip Light	FD-05-69	Low	Monthly Maintenance Routine	
4.2	Inertia reel & safety sling	Shackled / safety sling	FD-04-56	Low	Weekly Inspection	
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light	Bolted / safety sling	FD-05-70	Low	Monthly Maintenance Routine	



8 Additional Information / Comments

When compiling a comprehensive inventory, you should be aware of the following and make notes or comments where necessary:

- Common items (eg light fittings, PA speakers, sheaves and shackles) and items that are permanent features of each section
- Whether they are a common or singular item
- Verification of item design. Is it the same common item model?
- Snagging areas, eg cables and wires
- 'Temporary equipment' for which no-one can remember why it is there.

Ref	Equipment / Area	Fastening Method	Tag Number	Risks	Control	Comments
Area 1 : Crown and Water Table						
1.1	Antenna	Clamp	FD-01-18	Low	Weekly Inspection	Check security of clamp
1.2	Degasser Ventline	U-bolt	FD-02-36	Low	Weekly Inspection	Check for security and corrosion
1.3	Padeye Bracket	Welded	FD-09-02	Low	6-monthly NDT/ MPI	Check for cracks or deformation
Area 2 : Monkeyboard Level						
2.1	Monkeyboard Access Cover	Welded Bracket	FD-06-29	Med	Weekly Inspection	Lubricate hinges and check bracket for security
2.2	Electrical Junction Box	Bolted	FD-06-61	Low	Monthly Maintenance Routine	Check box for security
2.3	1/2" steel airline	U-bolted	FD-06-37	Low	Weekly Inspection	Check for security and corrosion
Area 3 : Travelling Equipment						
3.1	Travelling Block	Bolts & Pins	FD-03-02	Med	Monthly Maintenance Routine	Hang off and check for wear. Ensure all fasteners are tight and split pins are in place / undamaged
Area 4 : Drillfloor and Mezzanine Deck						
4.1	Strip Light	Strip Light	FD-05-69	Low	Monthly Maintenance Routine	Check security of light & safety sling
4.2	Inertia reel & safety sling	Shackled/ safety sling	FD-04-56	Low	Weekly Inspection	
Area 5 : Lower Substructure and BOP Deck						
5.1	Strip Light	Bolted / safety sling	FD-05-70	Low	Monthly Maintenance Routine	Check security of light & safety sling

Step 3:

Remedial Action

INSPECTION PROCESS

The inspection process, carried out both daily and weekly, allows you to assess the necessary actions required to prevent items within the derrick from falling.

You should consider integrating the inspection process into your Maintenance Management System. This provides one source of records and work planning and avoids dual systems and subsequent duplications of records. Those items not covered in weekly inspections should be made part of the preventative maintenance routines, eg top drive compensator, tong counterbalances (if not readily accessible).

Remember to customise the inspection checksheets according to your derrick inventory.

INSPECTION CHECKSHEETS

The derrick checksheets, which should be classified by your defined zones, allow you to identify the necessary inspection activities required for each individual item referenced in the inventory.

Daily Checksheets

Daily derrick inspection checksheets (see example overleaf) must be carried out and completed by the rig crew. Some inspection routines however, may require a mechanic to assist in preventive maintenance.

Daily inspections should involve a visual check on the item and be conducted by the dayshift, during daylight hours. The level and frequency of inspection routine for each item shall be determined by the risk rating established previously. Details of each routine should be noted on the inspection sheets.

A more thorough inspection of items that can readily be reached shall be conducted once per week (see Weekly Checksheets).

Weekly Checksheets

Weekly derrick inspection checksheets must be completed by supervisory personnel. They are also responsible for assessing the inventory to establish the inspection routines for each item. You should build up a portfolio of considerations which determine these routines, for example:

- risk
- manufacturers recommendations (risk assessment)
- historic maintenance and inspection records
- local / environmental considerations
- usage / redundancy
- rate of deterioration



The inspection routine should identify what prevents items within the derrick from falling. You may want to consider appointing an owner to each of the derrick zones to help with this process.

It is recommended that you include photographs and drawing references to each checksheet (see pages 16 -18). This enables the inspector to see exactly where and how each item should be prevented from falling.

Daily Inspection Checksheet								
Equipment	Description	Date						
Crown Block	Complete lubrication schedule on sheaves							
	General check of crown block							
Travelling Block & Retractable Dolly Assembly	Complete lubrication schedule on sheaves & rollers							
	Visually inspect dolly rollers to ensure roller pins & locking devices are secure							
	Visually inspect retractable dolly arms to ensure bolt, pin connections & locking devices are secure							
Topdrive & Pipe Handler	Complete lubrication schedule on top bearing, gearbox double lip seal & washpipe seal							
	Check oil levels in swivel & gearbox. Ensure gearbox LO differential does not exceed 1.5bar							
	Visually inspect swivel / gearbox area for loose fittings, particularly at service loop manifolds							
	Thoroughly inspect pipe handler assembly, particularly for loose fittings on link tilt assembly, IBOP actuator & torque wrench. Ensure locking devices are in place							
	Inspect bails and elevators. Check elevators for loose or damaged fittings & ensure locking devices are in place							
	Visually inspect bolts & lockwire on pipehandler torque wrench cylinder clamp end cover							

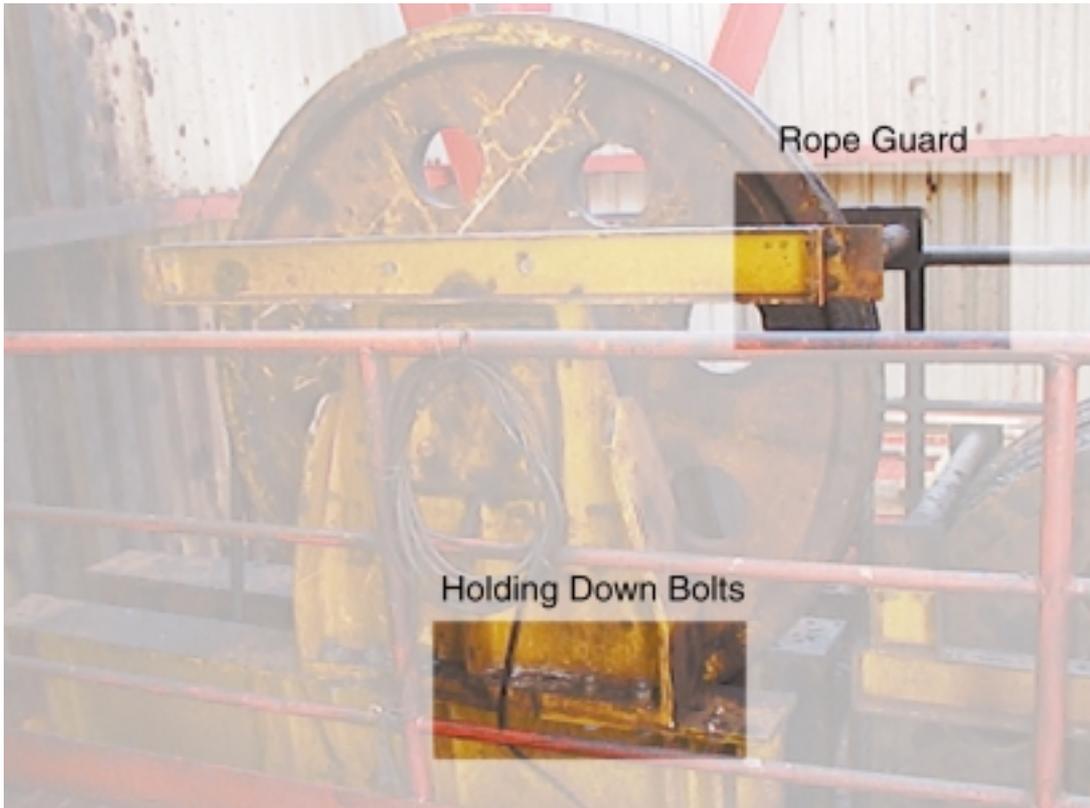
Weekly Inspection Checksheet
AREA 1
CROWN & WATER TABLE



Equipment	Drawing Ref.	✓ X	Initial	Comments / Non-Conformance
Windwall				
1. Visually inspect windwall panels for cracks, damage or looseness. Check fasteners are in place.				
Crown Block				
1. Check holding down arrgmt on crown assembly & fastline sheave. 2. Check security of sheave line guards. 3. Remove excessive tar from sheave clusters. 4. Check that all snatch block shackle securing devices are in place. 5. Check that all crown and watertable platforms are secure and clear of loose items. 6. Check all grating clips and tie wraps are secure. 7. Check all crown lighting fixtures are secure.	MOS Drgs: CTOO-DA1-019 CTOO-DA1-1267			
Anemometer				
1. Check all fasteners on anemometer brackets are secure.				

.....SignatureDate

.....Rig Supt.Date



Reference 1



Reference 2



Reference 3

REVIEW OF INSPECTION CHECKSHEETS

Completed checksheets should be passed to the Toolpusher / Supervisor for review and sign-off. Any non-conformities identified that cannot be corrected immediately should be addressed with the supervisor and the action decided accordingly. The inspector must use his judgement and knowledge to decide on whether immediate action is necessary.

Once you have a set of inspection routines, group the tasks by frequency to make this inspection process more efficient.

The inspection checksheets must be regularly reviewed and revised in detail to reflect any changes or feedback, such as:

- new equipment
- external impacts
- jarring
- drilling top hole (high vibration)
- conductor hammering (shocking)
- third party work done in derrick.

INSPECTION PERFORMANCE REPORT

An Inspection Performance Report lets you see, at a glance, any immediate deficiencies in the inspection process. The Report should reflect the total number of checks identified on the Weekly Derrick Inspection Sheets for the respective derrick areas. See below for an example of a Performance Report. **Remember to customise the inspection performance report according to your derrick inventory and inspection checksheets.**

See page 20 for an example of a completed performance report.

The Area Rig Supervisor is responsible for preparing the Inspection Performance Report and forwarding to the Rig Manager on a weekly basis.

Multiple records should be reviewed regularly to identify trends. You could publish these results quarterly to the workforce to keep everyone informed of your progress and the effectiveness of the scheme.

CONTROL OF TEMPORARY EQUIPMENT

Identify and implement an effective control for temporary equipment used within derricks, e.g. hand tools used during maintenance, equipment taken up the derrick for operations such as wireline work. The old age adage of “what goes up must come down” is extremely relevant. This control may take the form of one or all of the following:

- Derrick hand tool logsheets
- Utilisation of the location (barrier or PA announcement)
- Permit To Work System
- Securing tools to fixing points with lanyards.

See page 21 for an example of the tools log sheets.



Step 4:

Manufacturers and Suppliers

The information provided from the equipment Manufacturers and Suppliers should be scrutinised as to the applicability of the location /site equipment (see also Inspection and Maintenance Routines). From the identified items of major equipment, contact the Manufacturers and request:

- The relevant information of the item type and model number.
- All available Bulletin Notes and Product Newsletters produced.
- All equipment modification notices.
- All maintenance procedures relevant to the identified equipment.
- A Risk Assessment of the equipment to be undertaken in conjunction with the Manufacturers to ensure all potential risks are identified.
- Location/ Site Planned Maintenance Systems should be reviewed to ensure that all current Manufacturer maintenance recommendations have been incorporated into the system.

This thorough process needs to be undertaken to ensure that the equipment being used in the derrick structure is as per design. It will also ensure that any modifications or changes to equipment and its maintenance requirements is per the Manufacturer's latest recommendations.

Step 5:

Automated & Mechanised Derrick Systems

The principles as described in this document for preventing dropped objects do not change in the automated environments of remote controlled drilling systems. However, stringent inspection routines and familiarity with the proper use of automated systems must be maintained at all times.

Dropped objects as a result of collision can be avoided by making sure that in the design phase, the Anti-collision System and Rig Remote Control System form the basis for the Anti-clash and co-ordination, which should be designed to prevent interference between hoisting and drillfloor/derrick equipment. The method used mostly is to identify the zones and spatial corridors which more than one piece of equipment can occupy.

Zoning depends on equipment installed in the derrick and on the rig floor, taking into account maximum height and position etc.

Example: Zone 1

Between Drillfloor and top of Iron Roughneck:

Mud Bucket, Top Drive, Iron Roughneck, Pipe Handler (lower) are all able to occupy the zone. The working point for the zone would be fixed due to the maximum height of relevant equipment, plus a safety distance.

The rig can have up to five or six zones depending on the system/equipment installed.

From the dropped objects point of view, the most critical activity is the override mode.

NOTE: During override mode of (all) Rig Remote Control Systems, there is no Clash Protection active. Only the operator is responsible for control and intervention to ensure that equipment collision does not occur. Needless to say that this needs to be managed properly and may be controlled under a Permit to Work.



Step 6:

Third Parties

Check that the independent Third Party Hoisting and Lifting Surveys and Inspections are effective.

Some checks to ensure this effectiveness are as follows:

- The selection process for the chosen inspection company is adequate.
- The competence of the inspectors.
- The workscope given by the location being inspected is sufficiently detailed.
- That the follow-up of inspection findings is completed.

Third Party rented equipment handled and used in the derrick should be viewed in the same way once all Rig owned equipment has been considered.

Categories of equipment that fall under this heading are:

- Equipment supplied by a third party needing a fixture in the derrick and from which it is to be suspended.
- Equipment supplied by a third party working in the main load line of the derrick hoisting equipment.
- Equipment supplied by a third party that is installed on top of drill/casing/tubing string or used to convey wellhead equipment. This may sometimes be parked in the derrick.
- Equipment that is part of the drill string and can be racked in the derrick for any time.
- Coiled tubing units and equipment.
- Snubbing units.
- Hydraulic workover units.
- Wireline equipment.
- Slickline equipment.

Factors to be considered and taken into account when using this equipment are:

- An equipment rig-up plan.
- Working load envelope of the equipment/job.
- Securing methods of individual pieces of equipment to prevent Dropped Objects, especially of detachable items.
- Verification of equipment employed (load test, MPI critical parts, pressure test, etc).
- Design verification and in accordance with Lifting Equipment Bulletin API 8c.
- Supplier to carry out/show evidence of a Dropped Object Hazop on the equipment.
- Last test data.

Refer to the templates for examples of 3rd party equipment control mechanisms prior to using the equipment.

Step 7:

Operations

The main cause of dropped objects over the last five years has been winch operations. The principle of reducing the incident is based on the fact that the winch is designed / installed and maintained properly. The operation of the winch is such that the people are knowledgeable of the system, are trained banksmen and operate the winch within the design criteria.

Step 8:

Continuous Improvement

In order to keep the DROPS scheme live, the system needs to be updated whenever changes are made to the derrick inventory or the structure itself.

To keep the focus and management attention to this problem, you should regularly use and review the Derrick Inspection Performance Report, as described under Step 3.

In addition to the performance report, it is advisable to consider alternative methods of continuous improvements, for example:

- Regular feedback sessions on the effectiveness of this scheme
- Lessons Learned Report
- Website with bulletin board / discussions facility
- Publication of performance results
- Email / contact address for feedback



DROPS CD ROM

The DROPS CD ROM comprises:

THE GUIDELINES (PDF)

Step-by-step guidance on implementing the DROPS scheme is provided as an Acrobat pdf file for your reference.

THE TEMPLATES (WORD)

Sample templates of the forms, logs and procedures associated with the DROPS workpack are provided in Word format.

THE CASE STUDY (PDF)

A working copy of this scheme, which has been successfully implemented by BP Harding, is provided as an Acrobat pdf file for your reference.

THE TRAILER

A short, high-impact 'advertisement', promoting the DROPS workpack to the global drilling community is provided.