Learning from Incidents

80/90ft Wireline Mast Column Stop Plate falls 65ft / 19.8m (HiPo)

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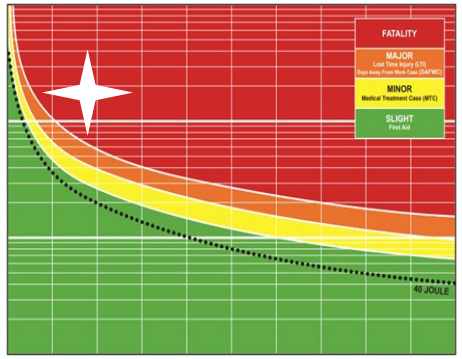
Incident Summary

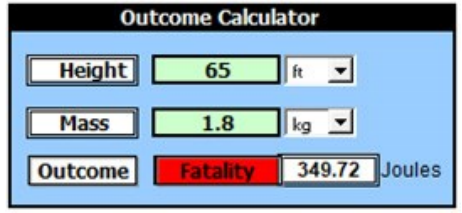
As the 90ft Wireline Mast was rigged up in preparation for operations, a dropped object was reported within the restricted access area.

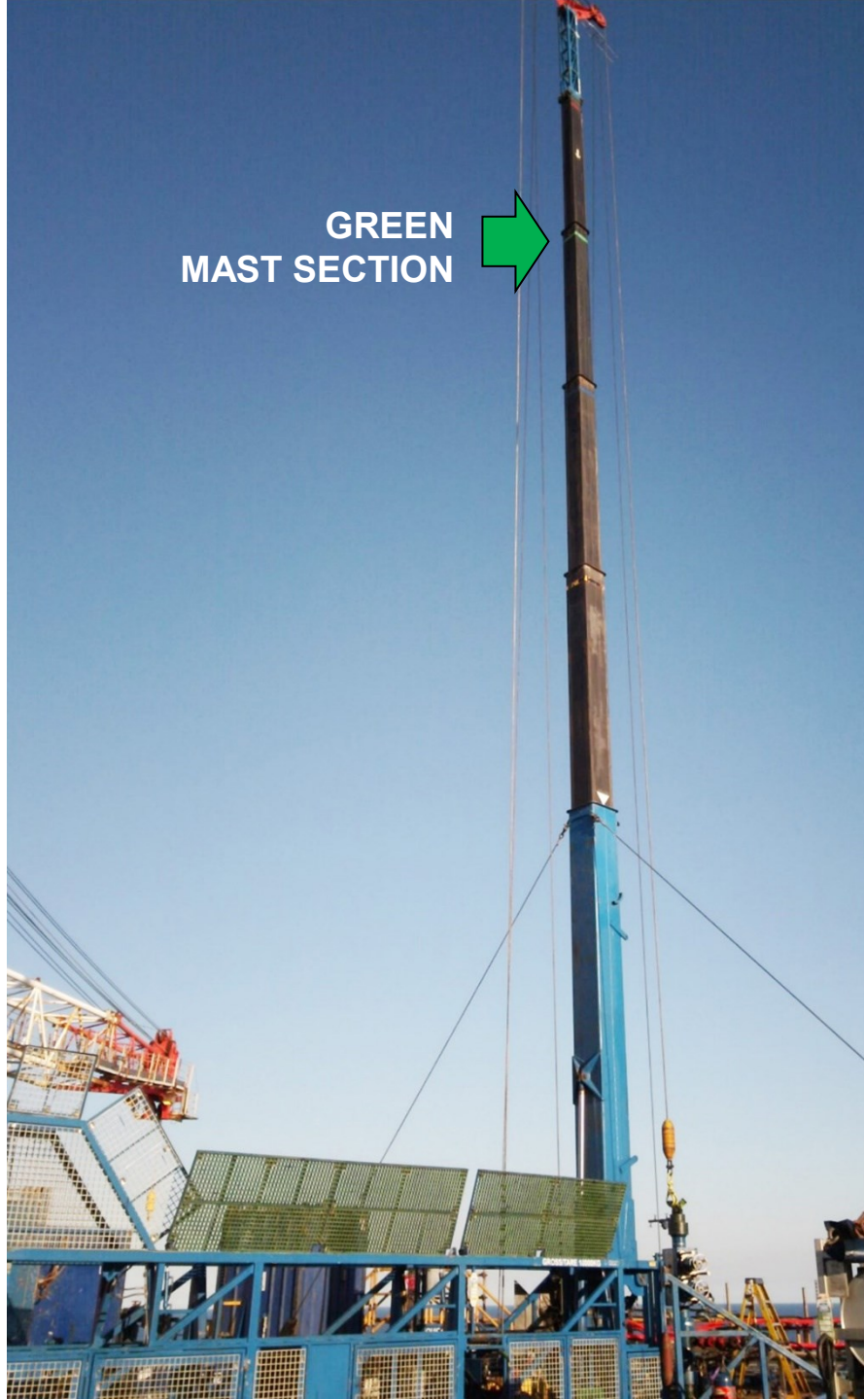
The area was secured and a sweep of the worksite performed, leading to the discovery of a mast column stop plate and four sheared 12mm HEX bolt heads, with a further 2 bolt heads later identified.

The stop plate weighing 1.8 kg had become detached from its position *(green mast section shown on right)* **and dropped 19.8m / 65ft to deck.**

STOP PLATE (25cm x 6.5cm x 1.5cm) & **BOLT HEADS**

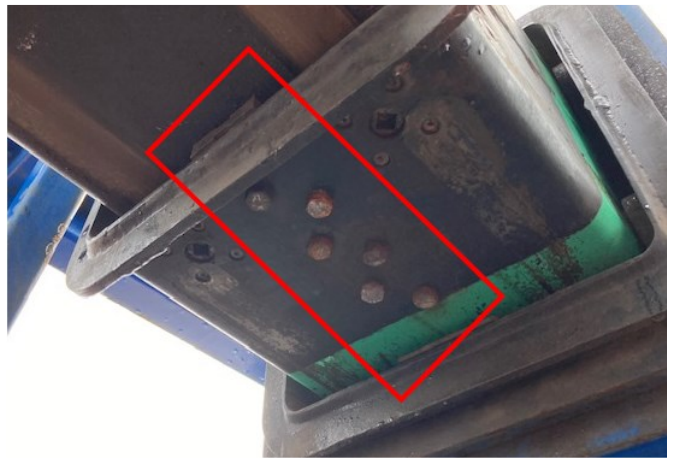




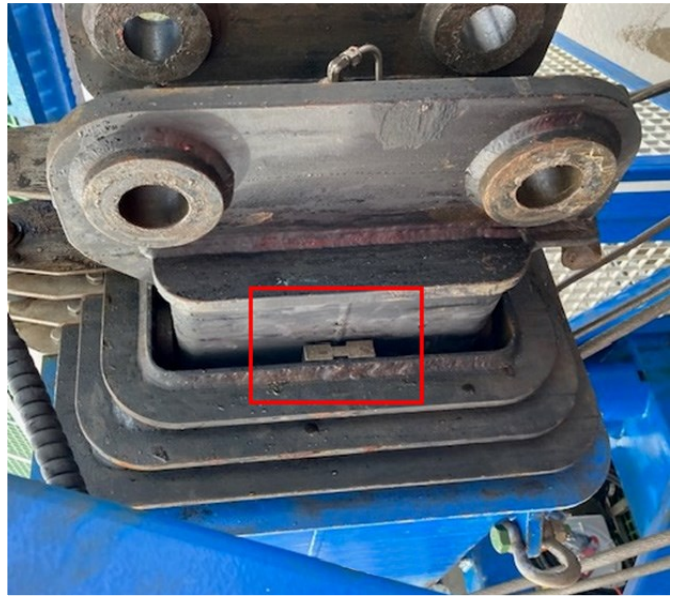


Incident Summary Images

Stop Plate fell from the ‘green’ mast section which had been extended to ~65ft / 19.8m



Underside stop plate correctly installed. Torque of bolts was checked at the time of visit and found to be correct



Other stop plate correctly fitted with around 2mm of clearance.

Causal Factors

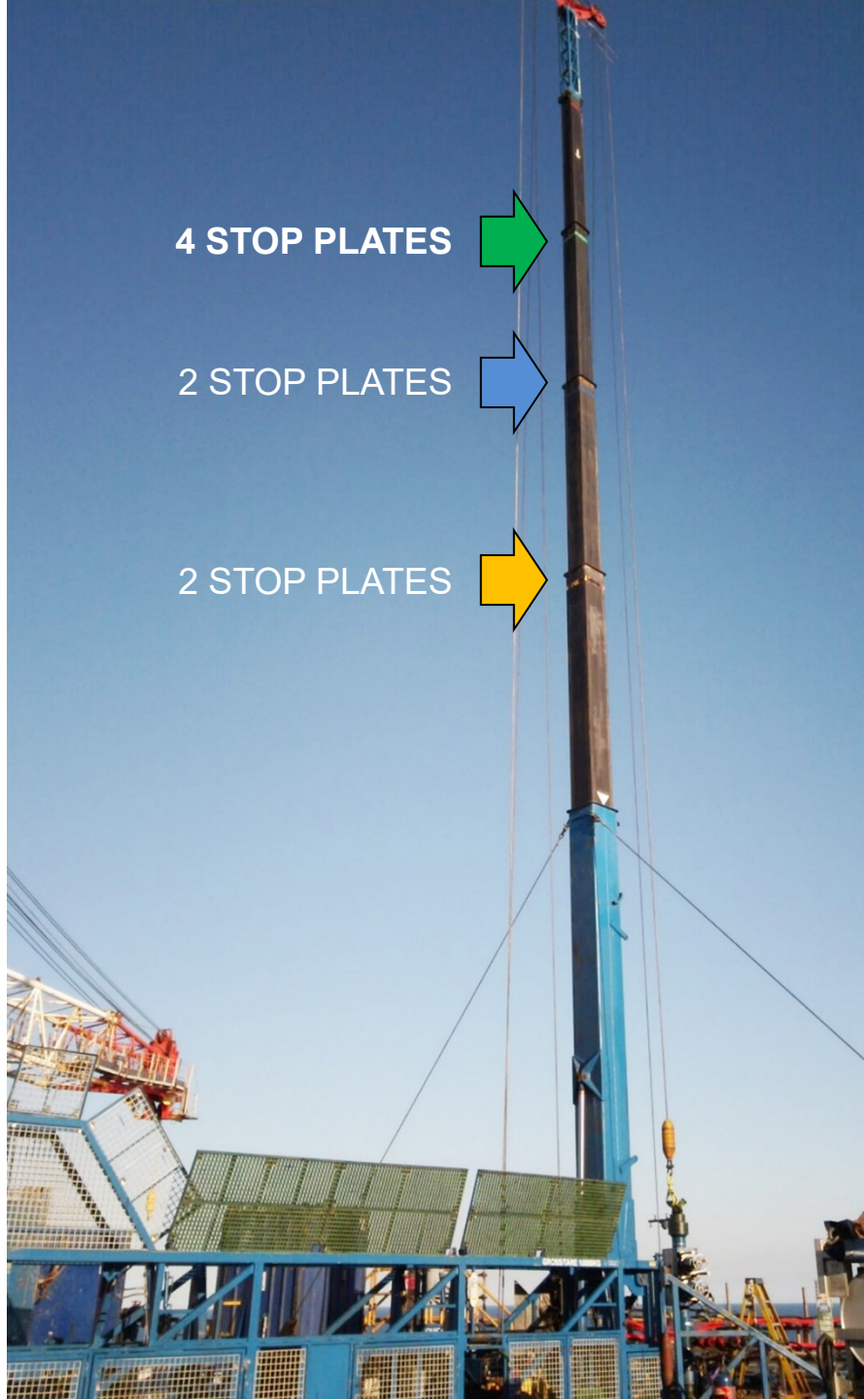
The stop plates are installed as a safety measure to prevent the mast outer column section from being over-extended beyond the design criteria and to maintain mast stability during operation.

The stop plate that dropped was found to be orientated incorrectly during servicing which can be attributed to:

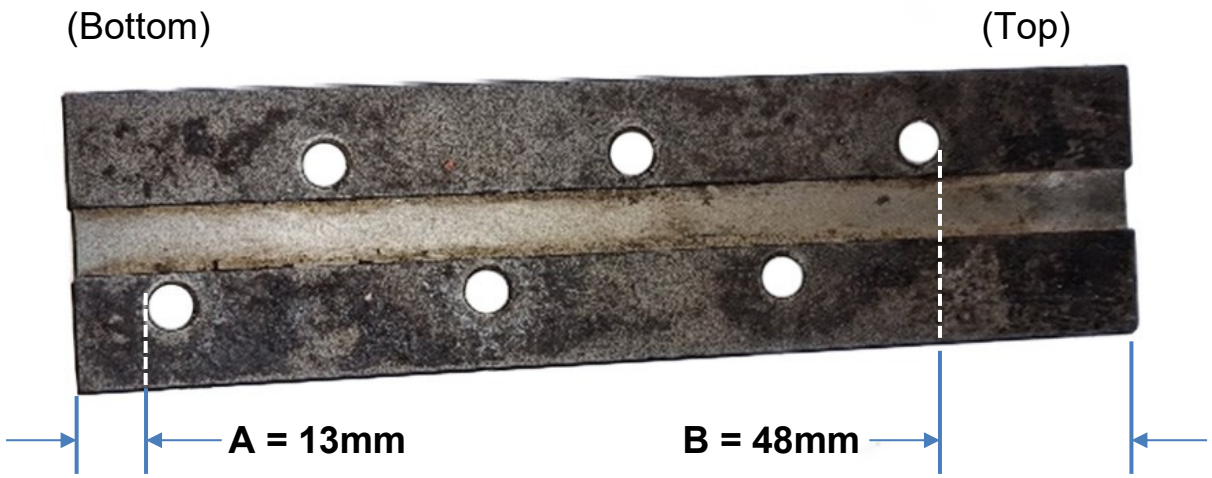
- **Design of plate enabled incorrect orientation;**
- **Lack of awareness of potential (no precedent);**
- **No clear maintenance procedure for stop plate installation during major servicing of mast.**

The end (green) column is the only column to have 4 stop plates in place. These are secured to the column section each with 6 x 12mm grade 12.9 Carbon Steel bolts.

The blue and yellow columns only have 2 stop plates and are of a different design and cannot be fitted in any other orientation.



Design (Error Trap)

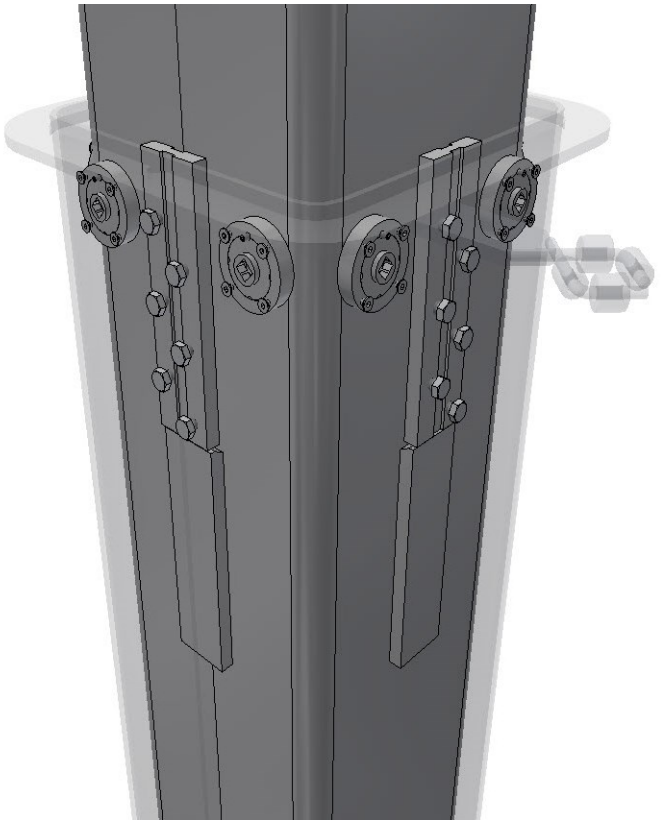


STOP PLATE

When installed correctly, distance **A** would have been at the bottom of the stop plate whilst the mast was in an upright position.

Due to the incorrect orientation, distance **B** was at the bottom of the plate, **leading to a 35mm difference between the incorrectly installed plate and the other 3 plates** (which were correctly orientated).

MAST COLUMN



Correct Installation

Design (Plate Orientation Error Trap)

In the incorrect orientation, the plate sits 35mm lower than the other 3 plates on this column.

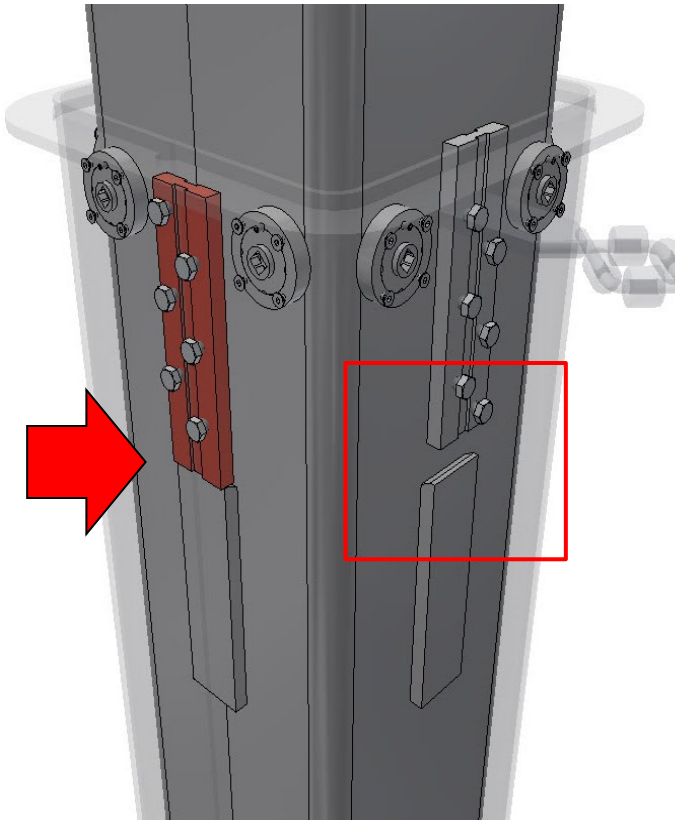
Due to this, when the mast is erected this stop plate is being impacted alone, without the other 3 being in contact.

35mm was the distance that the telescopic cylinder travelled when the bolts sheared.

In the correct orientation the plate sits flush with the section collar.

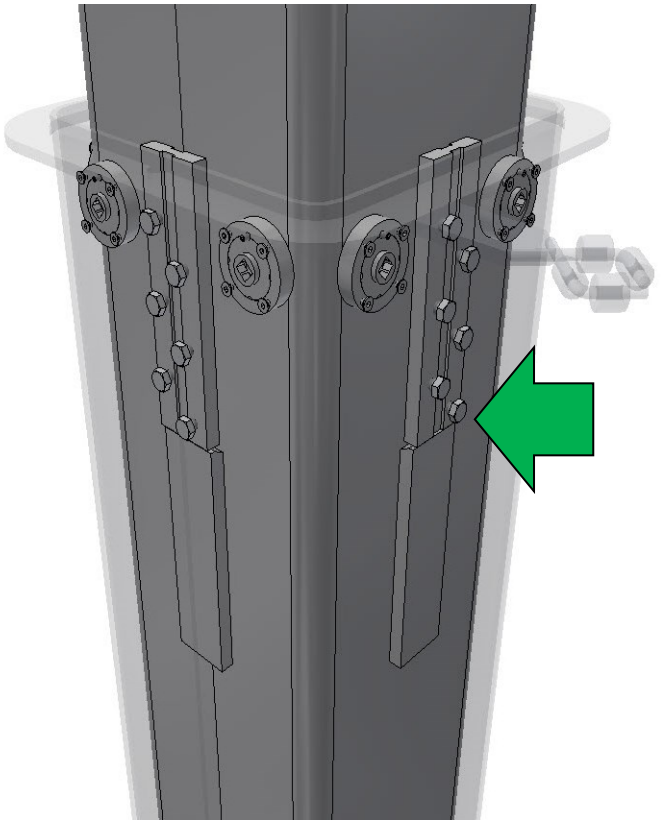
In the incorrect orientation it sits below the collar level (by 35mm).

MAST COLUMN



Incorrect Installation

MAST COLUMN



Correct Installation

Mast History

90ft (80ft with Jib extension) telescopic WL mast entering service in 2015.

Mast re-entered service following last major survey in 2021. Since that time, the unit has been mobilized on 7 occasions.

One month prior to the incident, pre-mobilisation maintenance checks were completed on the mast before it was mobilised in preparation for operations.

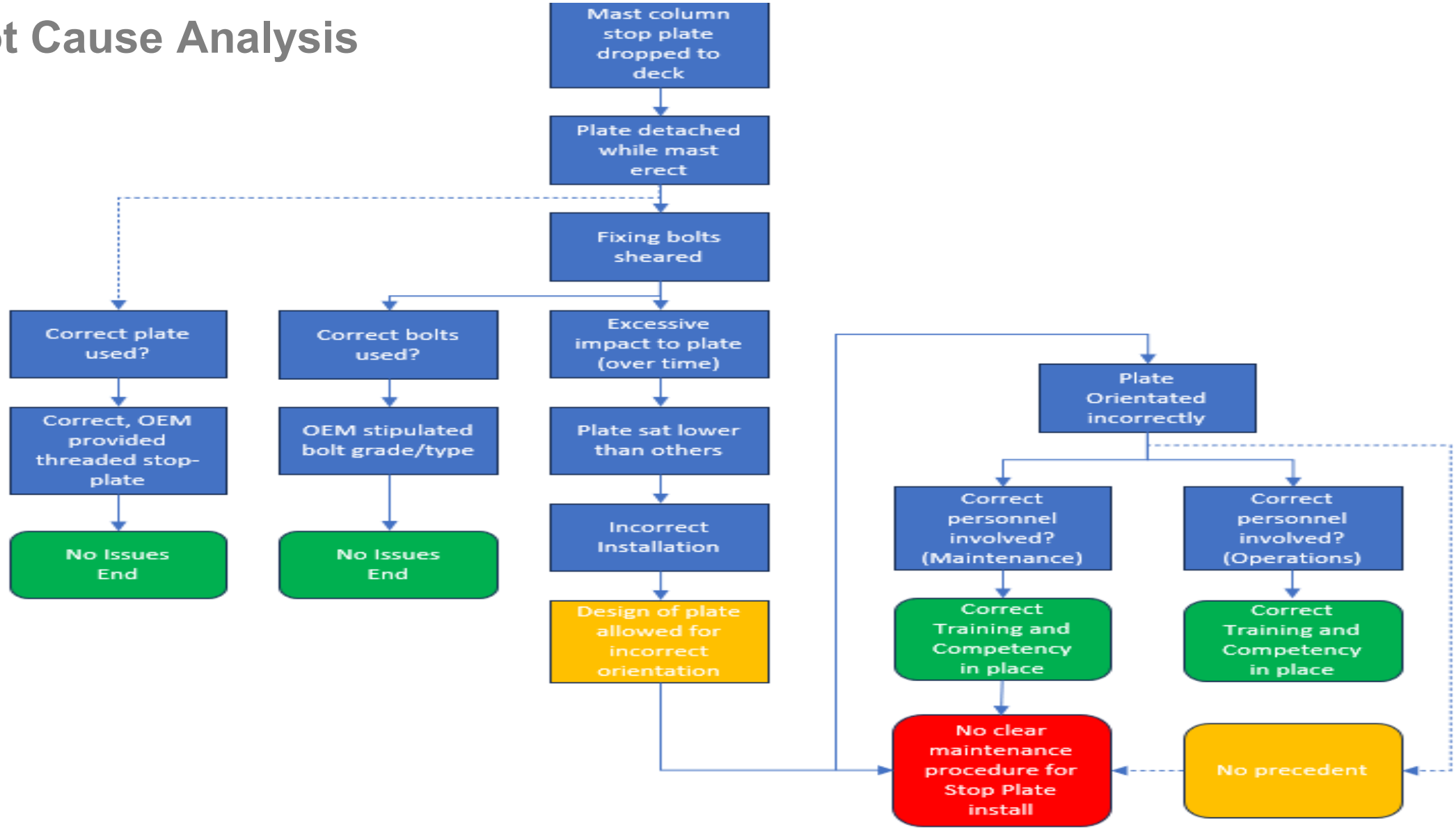
During Operations the mast had been rigged-up, and function tested prior to the incident occurring.

On the day of the incident, with the mast fully erected, one of the mast column stop plates (top column, approx. 65ft from deck level) was heard to fall to the deck below, with all 6 securing bolts sheared.

An immediate STOP was called to operations.

The mast was safely lowered, packed away and returned to shore for immediate quarantine.

Root Cause Analysis



Key Facts

COLUMN PRESSURE

- Correctly set (2,400psi). Confirmed on site at time of incident.

PERSONNEL

- All personnel certified and verified as competent in all aspects of Operations, Maintenance and Training.

OEM INPUT

- No shear stress or bearing stress would be transmitted under normal installation and use.
- Not aware of any previous similar occurrences.

METALLURGICAL TESTING AND ANALYSIS

- Confirmed securing were 12.9 grade Carbon Steel M12 Hex, this aligned with the manufacturer's recommendations.
- Both bolt and plate shear directions were approx. 180 degrees different from the expected force direction of the plate when installed correctly.

Key Facts (Documentation)

CONFORMITY

- All certificates available and in date.
- Thorough lifting examination performed prior to mobilization.

MAINTENANCE AND INSPECTION

- All documents in date and aligned with job history.

RIG-UP AND DROPS CHECKS

- Completed and verified, included checking column sections as mast was scoped out.

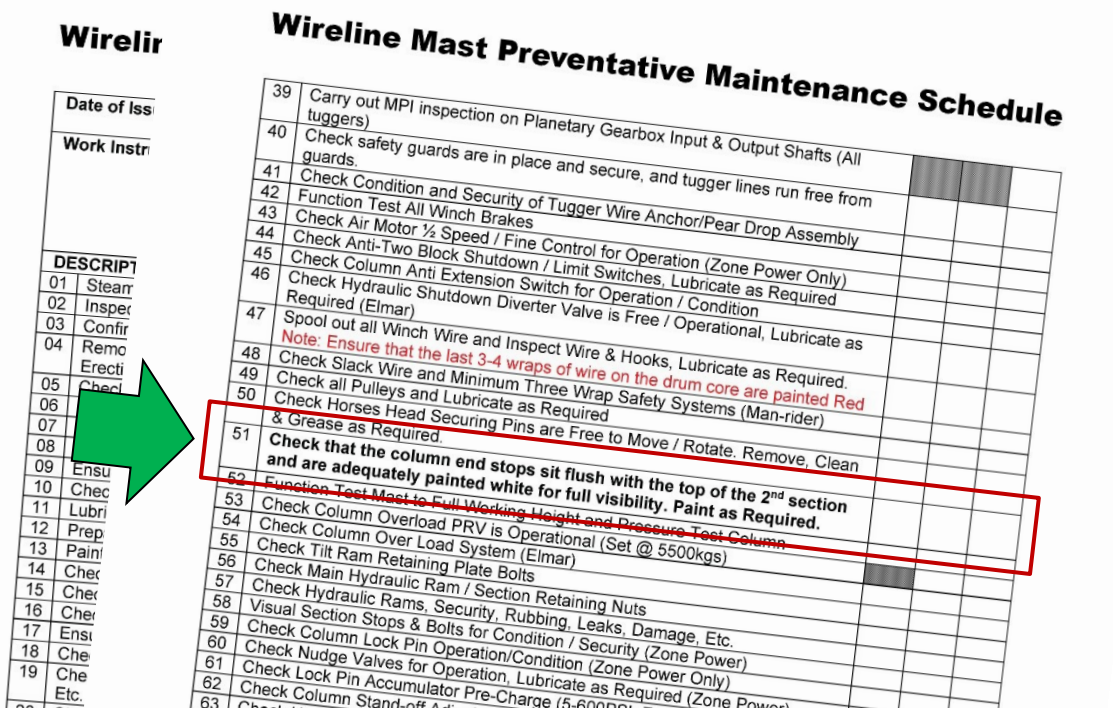
EQUIPMENT OPERATIONS AND MAINTENANCE MANUALS

- Last revision 2019.
- Several separate equipment and parts drawings.
- ***No clear detail on stop plate installation contained.***

Corrective Actions and Improvements

The following actions and improvements have been taken:

- Refit mast column stop plates with replacement bolts, verify alignment and apply paint to the upper (visible) section of plate to visually confirm correct orientation.
- Update maintenance checklist to ensure that the stop plate orientation is checked during every maintenance activity.
- Produce new maintenance procedure for stripping and rebuilding the mast column to include highlighting the safety-critical nature of the plate orientation.
- Publish technical bulletin for maintenance personnel and made available for reference during any additional inspection.
- **Share learnings through industry initiatives such as DROPS and Step Change in Safety.**



Wirelir

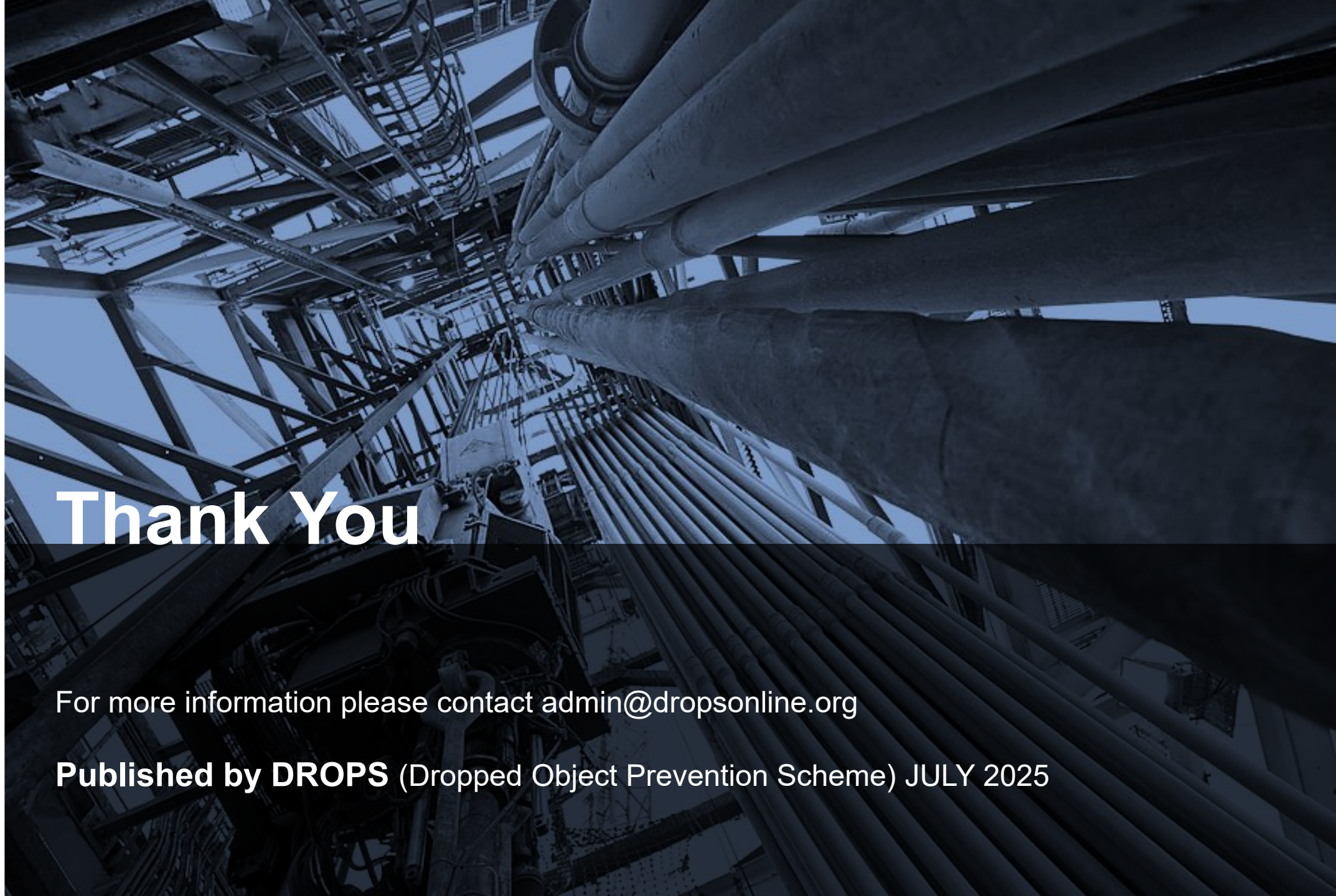
Wireline Mast Preventative Maintenance Schedule

Date of Iss

Work Instr

	DESCRIPT
01	Steam
02	Inspec
03	Confir
04	Remo Erecti
05	Checl
06	
07	
08	
09	Ensu
10	Chec
11	Lubri
12	Prep
13	Paint
14	Chec
15	Chec
16	Chec
17	Ensu
18	Chec
19	Che Etc.

39	Carry out MPI inspection on Planetary Gearbox Input & Output Shafts (All tuggers)
40	Check safety guards are in place and secure, and tugger lines run free from guards.
41	Check Condition and Security of Tugger Wire Anchor/Pear Drop Assembly
42	Function Test All Winch Brakes
43	Check Air Motor ½ Speed / Fine Control for Operation (Zone Power Only)
44	Check Anti-Two Block Shutdown / Limit Switches, Lubricate as Required
45	Check Column Anti Extension Switch for Operation / Condition
46	Check Hydraulic Shutdown Diverter Valve is Free / Operational, Lubricate as Required (Elmar)
47	Spool out all Winch Wire and Inspect Wire & Hooks, Lubricate as Required. Note: Ensure that the last 3-4 wraps of wire on the drum core are painted Red
48	Check Slack Wire and Minimum Three Wrap Safety Systems (Man-rider)
49	Check all Pulleys and Lubricate as Required
50	Check Horses Head Securing Pins are Free to Move / Rotate. Remove, Clean & Grease as Required.
51	**Check that the column end stops sit flush with the top of the 2nd section and are adequately painted white for full visibility. Paint as Required.**
52	Function Test Mast to Full Working Height and Pressure Test Column
53	Check Column Overload PRV is Operational (Set @ 5500kgs)
54	Check Column Over Load System (Elmar)
55	Check Tilt Ram Retaining Plate Bolts
56	Check Main Hydraulic Ram / Section Retaining Nuts
57	Check Hydraulic Rams, Security, Rubbing, Leaks, Damage, Etc.
58	Visual Section Stops & Bolts for Condition / Security (Zone Power)
59	Check Column Lock Pin Operation/Condition (Zone Power Only)
60	Check Nudge Valves for Operation, Lubricate as Required (Zone Power)
61	Check Lock Pin Accumulator Pre-Charge (5-600PSI)
62	Check Column Stand-off Ad
63	



Thank You

For more information please contact admin@dropsonline.org

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