



Santos

Support Vessel Incident

Laceration To Head

Steve Furze, 5 March 2009

Support Vessel Incident – 9th Oct 08

■ **Location**

- Support vessel on standby in port, located in Bass Strait

■ **Incident**

- Contractor Marine Engineer struck on back of head by 100 mm steel spacer bar falling from engine room ceiling

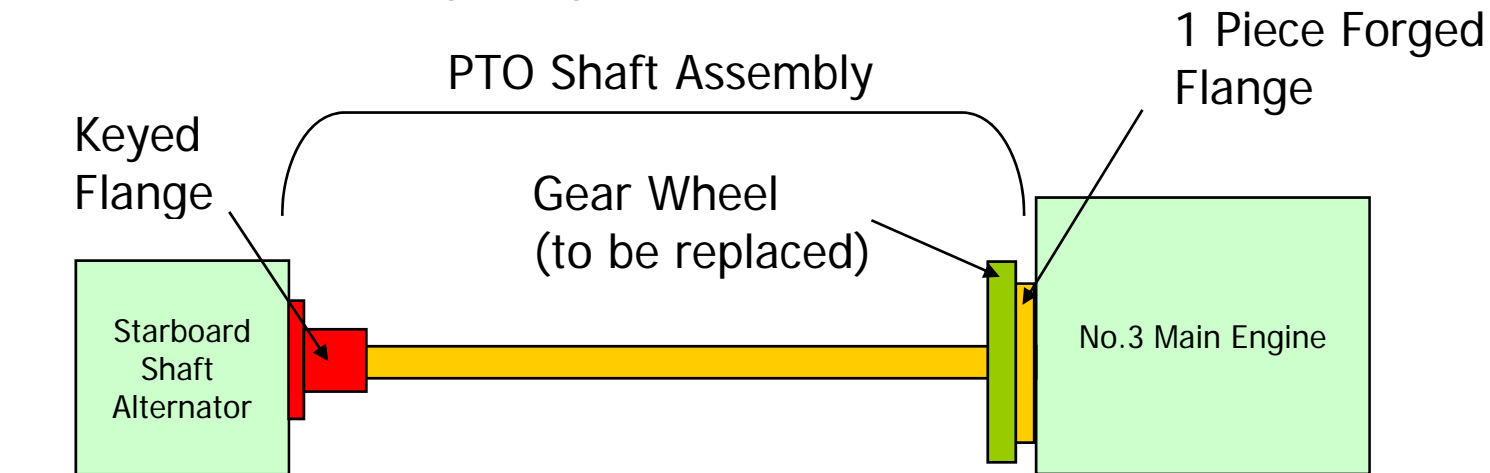
■ **Consequences**

- 7 stitches to the head

Support Vessel Incident - Planned Task

■ Planned Task

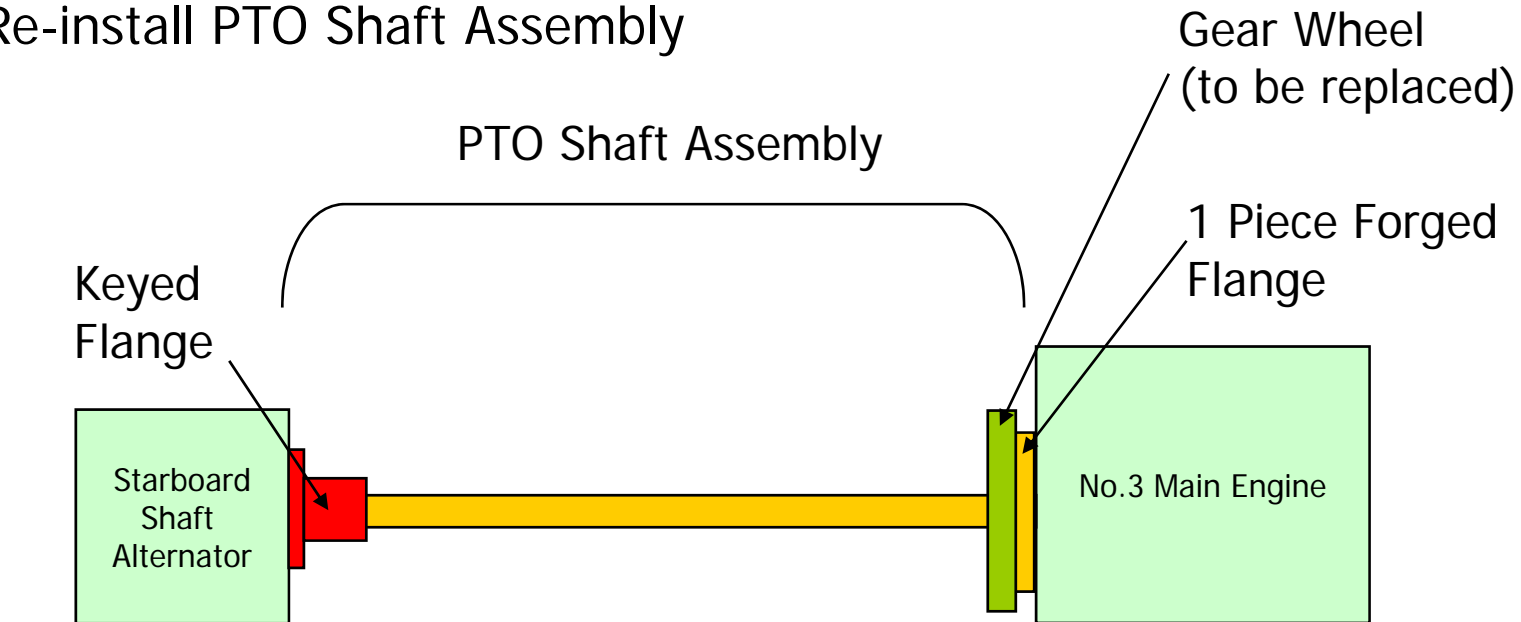
- Replace gear wheel drive for the No.3 Main Engine lubricating oil & fresh water pumps.
- Wheel is fitted to a Power Take Off (PTO) shaft positioned between the No.3 Main Engine and the starboard shaft alternator.
- Entire shaft assembly must be removed to replace the gear wheel.
- A keyed flange must be removed from one end of the shaft and re-installed after replacing the gear wheel.



Power Take Off Shaft Arrangement

Gear wheel replacement procedure:

- Remove PTO Shaft Assembly
- Remove Keyed Flange from PTO Shaft
- Remove & replace Gear Wheel
- Re-install Keyed Flange onto PTO Shaft
- Re-install PTO Shaft Assembly



Support Vessel Incident - Background

■ Background:

- A marine engineering contractor was engaged to provide assistance to the vessel's Chief Engineer
- Consideration was given to moving the PTO shaft assembly to an onshore machine shop. However,
 - access to the vessel's engine room is very restricted
 - estimated it would take an additional 24 hrs to move the PTO shaft assembly to/from the engine room to the main deck
- There was a perception that the repairs needed to be completed as soon as possible as it was thought that the vessel was required urgently

Support Vessel Incident - Sequence

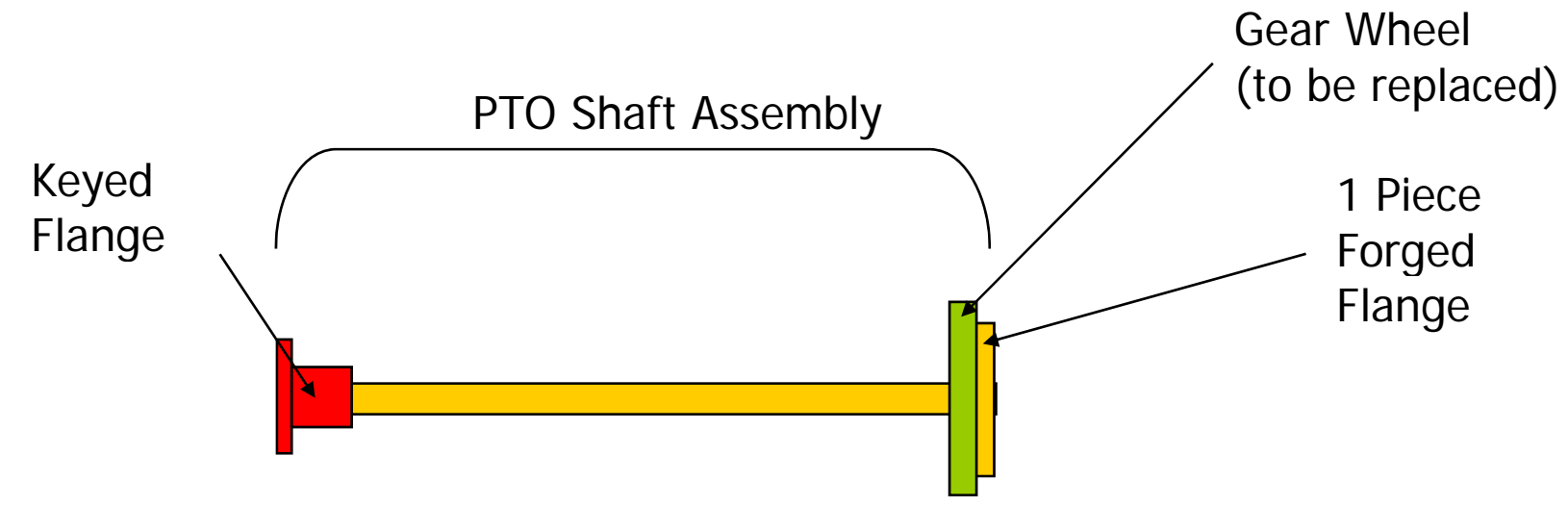
■ Sequence Of Events:

- Three marine engineering contract personnel arrived on the vessel 08:30 hrs Wed 8th October and completed a vessel induction.
- Toolbox talk was completed with all personnel involved.
- Work commenced 09:30hrs Wed 8th October to remove the PTO shaft assembly and replace the worn gear wheel.
- The adjacent piping was removed however problems were encountered removing the PTO shaft assembly.
 - The job had fallen behind schedule

Support Vessel Incident - Sequence

■ Sequence Of Events:

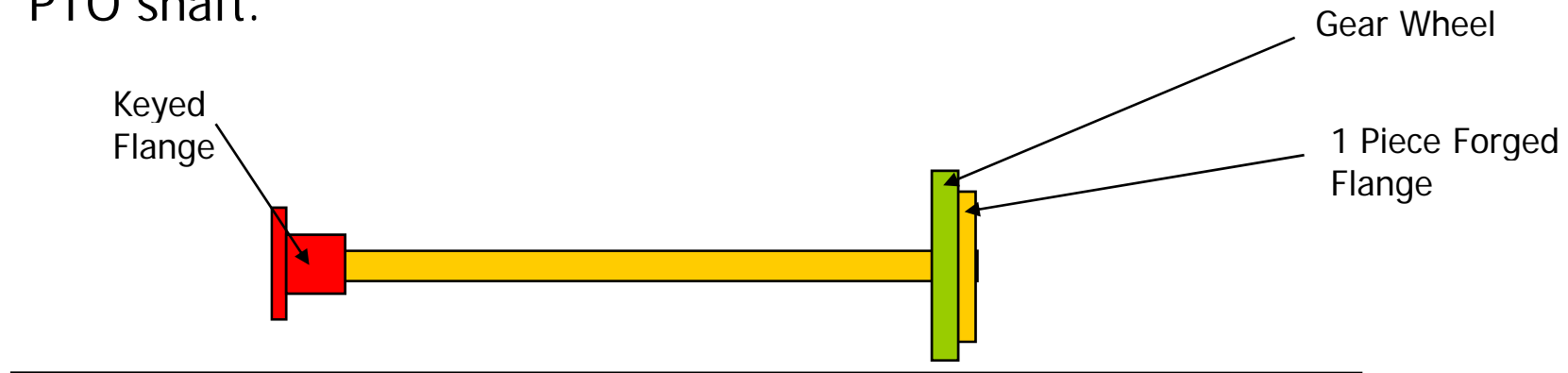
- Removal of the keyed flange had proven more difficult than expected, heat and hydraulic jacks were required.
- Change out gear wheel.
- Re-installation of the keyed flange onto the PTO shaft commenced at 15:00 hrs Thursday 9th October.



Support Vessel Incident - Sequence

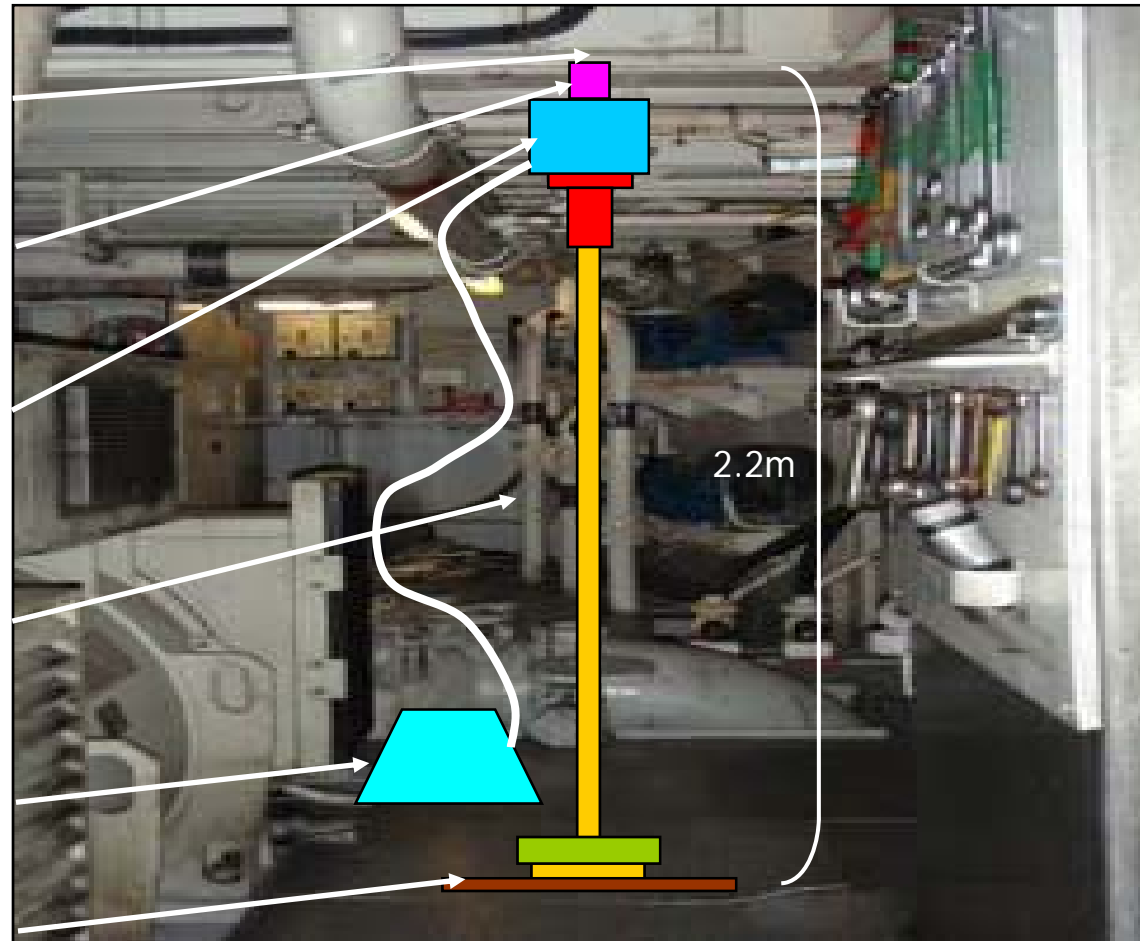
■ Sequence Of Events:

- Pre-job toolbox held prior to commencing re-installation of keyed flange onto PTO shaft. Identified that:
 - Pre-heating of flange required before re-installation
 - Jacking required to re-install flange
 - Flange to be jacked onto shaft as quickly as possible before it cooled down
- It was decided to position the PTO shaft assembly vertically use a hydraulic jack to install the pre-heated keyed flange onto the PTO shaft.



Keyed Flange Reassembly

- Tween deck beams
- 4"x4" RHS "Spacer"
- 30 ton- 10kg Hydraulic Jack
- 8" PTO Shaft Assembly
- Pneumatic Power Pack
- 4" x 8" Timbers



Shaft assembly was held vertical by 2 chain blocks

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■ **Sequence Of Events:**

- Flange keyway alignment problems, flange was a tighter fit than expected.
- With flange ~40 mm from final position, jack pressure required began to increase rapidly to ~15 ton.
- Injured Person (IP) noticed engine room floor plates beginning to buckle.
- Bent down to bleed off the jack pressure at the pneumatic power pack.

■ **Contact:**

- The jack scaped down
- The 4" RHS spacer section fell
- Struck the IP on the back of the head

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■ Post Incident Action:

- After receiving First Aid, IP was transferred to a local medical centre where he received 7 stitches.
- The IP returned to normal duties the following morning.
- The PTO shaft assembly was completed with the following procedural modifications:
 - Jack & RHS spacer secured to prevent them falling
 - The PTO shaft assembly was moved to an alternative location with larger beams
 - PPE was worn by all personnel



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■ **Contributing Factors:**

- **Inadequate engineering design:**

- PTO shaft not designed for onsite repairs
 - Minimal allowance made in vessel design for access to move the shaft to the main deck

- **Inadequate job planning:**

- The repair work should not have been attempted in-situ and should have been completed in an onshore workshop
- No formal risk assessment or JHA process used
- Self induced sense of urgency & time pressure.
 - Sufficient time could have been made available to complete the job safely in an onshore workshop if the operator had been aware of the issue

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- **Contributing Factors:**

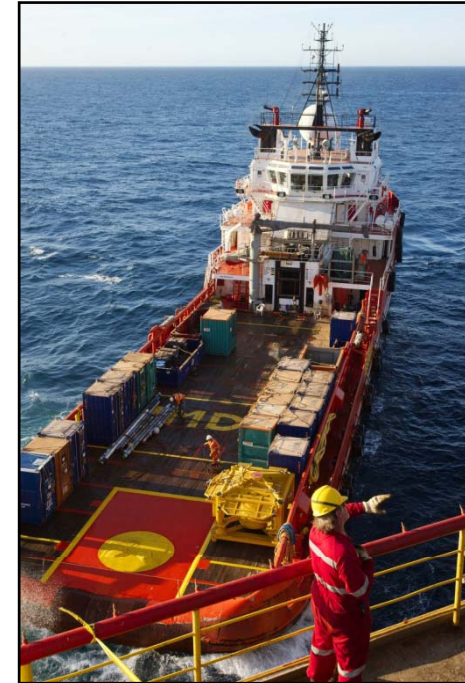
- **Lack of Hazard Awareness:**

- No recognition of hazards involved.
 - Chain blocks not adequate for restraining PTO shaft while jacking vertically
- No PPE was worn during the task and this requirement was not recognised during the Toolbox Talk
- Initial incident investigation by vessel owner did not recognise the risk of inadequate horizontal restraint
 - Job was completed using very similar procedure – used stronger beams to jack against
 - Risks were still not reduced to alarp

Support Vessel Incident

■ Summary

- Acceptance of sub standard work practices
- Incorrect perception of implied pressure
- Inadequate safety leadership – supervised by Chief Engineer
 - “Can do attitude”
- Inadequate controls
 - Even after second attempt to install flange
- Injury was low severity – stitches only, back to work next day
- However, **high potential for serious injury**
- Issues consistent with other support vessels
 - Limited daily prevailing influence
 - Number of serious incidents, near misses on vessels in 2008 (TRCFR 24 cf 6 on rigs)
 - Implementing similar EHS initiatives as to rigs



Questions

