

## IMCA Safety Flash 18/09

December 2009

These flashes summarise key safety matters and incidents, allowing wider dissemination of lessons learned from them. The information below has been provided in good faith by members and should be reviewed individually by recipients, who will determine its relevance to their own operations.

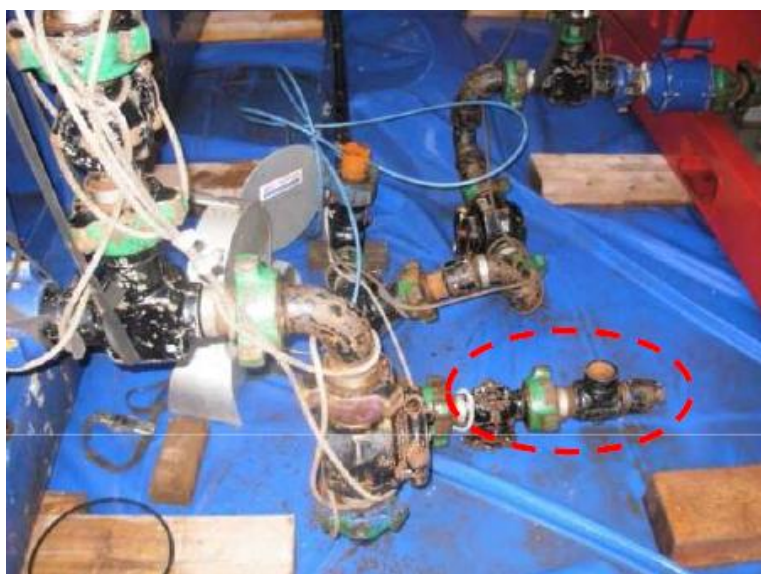
The effectiveness of the IMCA safety flash system depends on receiving reports from members in order to pass on information and avoid repeat incidents. Please consider adding the IMCA secretariat ([imca@imca-int.com](mailto:imca@imca-int.com)) to your internal distribution list for safety alerts and/or manually submitting information on specific incidents you consider may be relevant. All information will be anonymised or sanitised, as appropriate.

A number of other organisations issue safety flashes and similar documents which may be of interest to IMCA members. Where these are particularly relevant, these may be summarised or highlighted here. Links to known relevant websites are provided at [www.imca-int.com/links](http://www.imca-int.com/links). Additional links should be submitted to [webmaster@imca-int.com](mailto:webmaster@imca-int.com)

### I Fatality During Pressure Test

A fatal incident has been reported which, while it took place on a drilling rig, is also relevant to many vessel operations.

During a pressure test with nitrogen, a pressure relief valve in the treating line vented. The valve was rigged up in a vertical position approximately 60cm above the height of the line. As the valve vented, the assembly rotated through 90 degrees and hit the deck of the rig. During this rotation the assembly struck a crew member on the temple causing a fatal injury.



*Valve equipment that moved following release of high pressure*

Following investigation, the following points were noted:

- ◆ As the valve vented, the force caused the vertical stack to rotate through 90 degrees until it came into contact with the deck;
- ◆ The crew member was in the high pressure area while pressure was being applied in order to check the pressure on an instrument in the vicinity.

The following lessons were drawn from the incident:

- ◆ There should be an exclusion zone around all high pressure equipment under test. No personnel should be in this zone while pressure is being applied. Where authorised personnel do need access, this should be subject to further risk assessment and additional controls or barriers put in place. No further increases in pressure should take place whilst personnel are in the high pressure area;
- ◆ As far as possible, instrumentation in a high pressure exclusion zone should have remote viewing or monitoring capability in a low-risk area;
- ◆ When working near pressurised equipment personnel should keep clear from likely pressure release points and always out of the line of fire from vents and relief outlets;
- ◆ Equipment that could move in reaction to the sudden escape of gas under high pressure should, as far as possible, be properly secured, anchored or immobilised. All fittings and connections on pressure test equipment should be rated for the test pressure and adequately secured.

## 2 Fatal Incident Onboard a Dive Support Vessel

A member has reported an incident in which a rigger was fatally injured when a large steel frame, known as a cursor, fell from a height of two metres trapping the rigger and resulting in fatal crush injuries to his chest. He was declared dead on arrival at hospital.

Work was being conducted onboard a dive support vessel (DSV) to modify the mode of operation of the cursor to 'active mode'. An 'active cursor' is a frame that can independently be lowered, attach itself to the diving bell and be used to independently lift or lower the bell.

The work involved installation of a new hydraulic winch, structural modification and associated pipe-fitting. The workers involved with the modifications were experienced.

The cursor was suspended above the diving bell by the newly installed winch and it fell as a result of a failure of the hydraulic braking system for that winch. A rigger was working on top of the diving bell modifying some buoyancy units at the time of the accident. Although there were a number of other people in the vicinity and close to the worksite there were no other injuries.

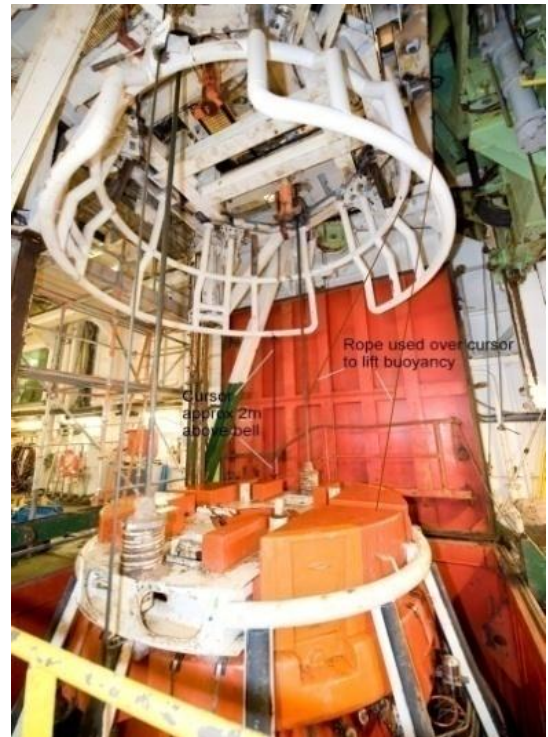
The immediate cause of the winch failure was determined to be a faulty pilot valve in the cursor's winch control system. A technical failure in the pilot valve prevented the automatic brake application on the winch.

Following investigation the company noted the following:

- ◆ A faulty pilot valve in the winch system failed, causing the brakes not to be applied in the stop position. This resulted in the hydraulic winch being unable to hold the weight of the cursor, which caused the winch to unwind and drop the cursor;
- ◆ There was no visual indication at the winch control panel that the brakes had been correctly applied, i.e. there was no warning system built into the hydraulic system by the manufacturer;
- ◆ Single point failure of this pilot valve had not been identified as a failure mode for the hydraulic system;
- ◆ The importance of the commissioning phases and interfaces for the hydraulic system and its control mechanisms were not sufficiently identified and were not appropriately managed;
- ◆ The control system was not fully commissioned prior to its use;
- ◆ The company's own internal project management systems were not fully utilised;
- ◆ Communications and reporting lines within the project team and with offshore and onshore management were neither fully utilised nor understood;
- ◆ Design intentions and pre-commissioning requirements for safe operation of the new equipment had not been properly communicated to the work team;
- ◆ There was no secondary means of securing the active cursor;
- ◆ A decision was taken to work under the cursor. The hazard of working under a suspended load was not recognised as it was not a 'typical' load suspended from a crane.

The company drew the following lessons from the incident:

- ◆ There should be a clear and fully understood definition of the statement of requirements when dealing with external providers;
- ◆ External providers should provide clear pre-commissioning and commissioning guidelines and follow them during commissioning;
- ◆ Project management for 'internal' company projects should be to the same rigorous standard as applied when managing client projects. In particular, personnel competency requirements should be rigorously applied for all project management;
- ◆ There should be a clear definition and understanding of the responsibilities and reporting lines of those managing such work both on and offshore. Lines of responsibility between vessel-based personnel and shore-based staff should be fully agreed and understood prior to commencing the work onboard;



*Diving bell with cursor above*

- ◆ All safety management tools, such as behavioural observations, toolbox talks, risk assessments, time out for safety etc., should all be working as planned;
- ◆ There should be adequate ownership, supervision and intervention of all 'projects' onboard the vessel through onboard review meetings and safety intervention tools. This is particularly important when operating conditions are subject to change, as during installation, commissioning, trials and harbour activities;
- ◆ Structured review such as failure modes and effects analysis (FMEA) and both internal company approval and external approval should be obtained before commissioning hydraulic and other complex safety-critical systems;
- ◆ The change from commissioning phase to operational phase must be clearly defined, particularly for safety critical equipment. Personnel should not make assumptions about the integrity of equipment before it has been formally accepted as operational;
- ◆ Measures should be in place to identify and mechanically secure suspended loads before passing beneath.

There are clear lessons to be learnt relating to personnel competence, project management, communications and lines of responsibility, supervision, utilisation of procedures and risk awareness. This incident highlights the importance of making sure that all the systems and controls in place to act as barriers and prevent an accident should be properly maintained and proven to be working at all times.

The specific barriers that failed to prevent this incident were:

- ◆ Project controls – these should be robust and always utilised for internal as well as external projects;
- ◆ People selection and development – competence schemes should fully operational and effective;
- ◆ Technical integrity – there should be robust design and effective equipment quality control;
- ◆ At a practical and basic level the final barrier which should always be in place, and which was not in this case, is: Always be aware of the surroundings, look out for 'non-obvious' suspended loads; and
- ◆ **Never work under a suspended load – and challenge others who do!**

### 3 Lost Time Injury to Leg

A member has reported an incident in which a sub-contractor's employee suffered a leg injury which was categorised as a lost time injury (LTI). Whilst working on offloading a vessel, the sub-contract employee's left leg above the ankle was pinned between a shifting spreader bar frame and a freight container located adjacent to the spreader bar frame. While one of the seven spreader bars was being lifted and in the air the remaining bars shifted, causing the frame to slide approximately one metre (40 inches) towards the freight container where the employee was standing. Hydraulic power packs were used to help free the trapped employee, who was taken to the local hospital. The employee suffered a hairline fracture of the left ankle and the incident was categorised as an LTI.



*Injured person's ankle was trapped between yellow spreader bars and blue freight container*

Following investigation, the company noted the following:

- ◆ The supervisor in charge did not follow in-house job safety analysis procedures;
- ◆ The sub-contractor personnel were not required to follow in-house job safety analysis procedures;
- ◆ The sub-contractor did not provide the specified fully trained personnel but, rather, a general labourer.

The company implemented the following actions to prevent recurrence:

- ◆ Installation of clips to secure the load frames to the deck and installed additional safety stops on the load frames to hold the spreader bars from moving
- ◆ Audit of training records of all sub-contractor personnel in order to ensure that personnel without proven competence or proper training were not accepted for work;
- ◆ The sub-contractor was asked to provide full training for all contract personnel, which should be:
  - appropriate to the work being performed
  - compliant with local regulatory safety standards
  - fully verifiable through testing;
- ◆ Senior leadership would provide clear guidance to supervisory personnel that safety processes and procedures could not be cut short.

#### 4 Loss of ROV: Dropped Object

A member has reported an incident in which a remotely controlled vehicle (ROV) and its tether management system (TMS) were dropped to the seabed following failure of the umbilical termination. During recovery of the system, just as the bullet was about to enter the docking head in the A-frame, the umbilical separated from the TMS and both the ROV and its TMS were dropped to the seabed. Immediately after the incident occurred, all electrical power to the ROV was switched off and high voltage equipment was earthed according to procedure. The incident occurred three months after the latest umbilical re-termination.



*Picture of cast taken after re-termination*



*Two months after the cast was made. The strands show signs of being pulled into the cone. (Random picture available from system)*

*Umbilical termination (cast)*



*The surface of the inner cone was corroded and rough, although loose rust was removed*

An investigation found the following:

- ◆ The friction on the inner wall of the bullet was found to be greater than the combined friction of the strands, with the result that the cast was not able to be drawn down and wedged properly;
- ◆ During the investigation it also became clear that the relevant checkpoint in the maintenance programme was not detailed enough.

The root causes of the incident were determined to be:

- ◆ Friction on the inner wall of the bullet was greater than the combined friction of the strands;
- ◆ An important quality control checkpoint lacked clear, and easy to follow, instructions.

The following corrective actions were made:

- ◆ A new maintenance checkpoint task was added for inspecting the armour strands for any signs of being pulled through the potting;
- ◆ Pictures of the cast structure of the company's entire ROV fleet were initiated immediately following this incident, for further review and technical analysis;
- ◆ Further pictures of the cast structure of every ROV system would be taken on a frequent basis;
- ◆ All bullets made of carbon steel would be changed out and replaced with a new type of bullet made of stainless steel. This would eliminate corrosion and friction to the inner walls of bullet.