IMCA Safety Flash 07/04

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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) 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 Additional links should be submitted to webmaster@imca-int.com

1 Exhaust Valve Cage Assembly Blow-Out

Keywords: Near Miss

A member has reported the following serious incident which occurred aboard one of its vessels. It has been categorised by the company as 'near miss fatality' – fortunately the only damage sustained was to equipment. The aft exhaust valve cage assembly from one of the units blew out of the engine, damaging the rocker arm assembly and destroying the rocker cover.

The assembly struck the lifting beam above the main engine and was deflected directly aft over the turbo-charger, narrowly missing the duty engineer, who had been inspecting a tappet knocking noise at a nearby cylinder head. The assembly landed on the bottom plates near CPP pumps.

Jacket cooling water was gushing out of the cylinder head of the damaged unit, restricting direct access to the main engine controls. The duty engineer ran from the engine room to the engine control room and informed the bridge to use the emergency stop to shut down the main engine. The main engine was stopped within twenty seconds.

The damage was summarised as follows (see pictures below, which show the position of the engineer at the time of the incident):

- the exhaust valve cage assembly was blown out of the cylinder head, shearing one holding-down stud and stripping the thread out of the nut of the second holding-down stud;
- the rocker arm assembly was damaged beyond repair;
- the rocker cover was destroyed;
- the rocker gear bridge piece casting had a section of the holding-down base broken off and was beyond repair;
- the lifting beam gantry above the main engine had a significant dent;
- the alarm light and fluorescent light above the main engine were destroyed.

The immediate assumption was that the unit had hydraulically locked due to ingress of water into the cylinder liner and preparations were started to remove the unit for inspection and repair.

The company's subsequent investigation established that the incident could be directly attributed to sea water entering the combustion space of the unit via the scavenge air system, hydraulically locking the engine cylinder, due to the failure of a sea water cooling tube on the charge air cooler, the failure of the scavenge air/water drains and the failure to check the drains' condition during normal watchkeeping rounds.

The exact time of the failure of the sea water cooling could not be ascertained, but it is believed that it could have been leaking over a period of time. The company is of the opinion that a slug of water had been trapped behind the built-up sludge at the charge air cooler. This slug of water/sludge travelled along the charge air manifold, blocking the drain cocks and entered the cylinder.

The volume of water entering the cylinder was greater than what could have been consumed in the combustion cycle. The quantity of water would have been minimal, as there was only 0.2mm bump clearance from the piston crown to the cylinder head. A full hydraulic lock with complete flooding of the unit did not occur, as in such a case greater damage to the piston, connecting rod and crankshaft would have resulted.

The second engineer was in attendance, investigating an unusual noise coming from another unit as part of his normal watchkeeping duties. The failure occurred before the analysis of that problem had been completed.

Clockwise from top left:

- *Location of impact above cylinder;*
- *Rocker cover fragments;*
- *Position of engineer when incident happened*

The company has instigated the following preventative actions as a result:

- removal of current scavenge air drain cocks and replacement with ball valves with a bigger bore;
- fitting of drain cock clearing devices at each drain cock;
- further development of previous engine room rounds check sheet to provide regular and accurate inspection of plant and equipment against specific performance criteria;
- more thorough checking during watchkeeping rounds in accordance with engine room practice.

While not directly related, it has also recommended the following:

- updating of engine room procedures;
- seeking to establish, as much as possible, more continuity of engine room crew;
- providing earlier, longer and more detailed familiarisation for engine room crew not familiar with/new to a vessel;
- developing a written procedure to show requirements and expectations for situations where the whole engine room crew is new to the vessel, which should clearly explain:
  - the maintenance system onboard the vessel;
  - the method of storing maintenance records;
  - the style of watchkeeping and parameter recording required and the supply of suitable logbooks for this purpose;
  - handover procedures between chief engineers, to ensure that required knowledge is passed on.