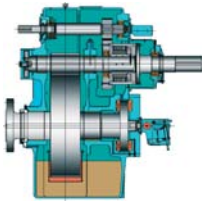
REDUCTION GEAR / CLUTCH



We believe more training is in order because of the number of subtle differences in the designs of marine clutches. With inflatable flexible gland clutches, either the elastomer (rubber) gland or the wear elements in contact with it (typically friction shoes) are known to reach the wear-out point unexpectedly. Depending on exactly what wore out and how it wore, this component has been the cause of "failure to disengage" as well as the obvious failure to engage. However, many clutch-related Loss of Propulsion and/or Maneuverability failures have been due to the loss of control air to the clutch.

CONTROL AIR VALVE

In addition to the valves, the entire control air system needs more attention because of the many different places where control air can leak; between the air supply and the clutch. Mechanical linkage has been known to come loose; most commonly between the pilothouse control and the air supply. The air regulators for the pilothouse throttle controls should have preventive maintenance plans and the vessel's master, pilot and engineer should all be conversant in the plan's language. Some degree of training might be in order.

PROPELLER AND SHAFT

Eliminating the entries where a propeller was fouled by a floating object or a line, there are numerous instances of actual propeller loss. When a blade was lost, we see that overspeed and/or shutdown often follows, but not always. When the entire propeller is lost, shutdown of its drive engine always follows promptly; be it a governor-controlled automatic shutdown or a manual shutdown. Assuming a twin-screw vessel, the immediate consequence is reduced maneuverability, possibly resulting in a collision, allision or grounding, until the speed drops to a point where single engine maneuverability can be achieved. Depending on the size & weight of the tow, this can take a few minutes. A broken propeller shaft, especially a break in the tail-shaft section, has the same effect as a lost propeller but with the added possibility of the shaft sliding aft such that the propeller jams the rudder. Single-engine handling training is recommended. Inspection of shafts, propellers and rudders by a diver after a flotsam strike is highly recommended. Most of the failures that cause a towing vessel's diesel generator to stall or trip-off the line are related to the diesel end of the generator set. We have seen the same failures that we saw with propulsion diesels, in more-or-less the same proportions. Concerning the generator end of the set, the most common failure items are the voltage regulators and wires. The main leads and other wires should be inspected periodically; looking for cracked and/or oxidized insulation.

HULL PLATING

Sometimes when cracked or otherwise defective hull plating is found, the origin of the defect cannot be determined. Given the age of some of the vessels, it can sometimes be assumed that the defect occurred naturally; without a collision, allision or grounding. A good recommendation would be to inspect the underwater hull & bottom plating when the rudders, propellers & shafts are inspected; in drydock or by a diver.

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UNITED STATES COAST GUARD

TOP 10 TOWING VESSEL MATERIAL FAILURES

PURPOSE

We conducted an analysis of all material failures recorded by CG Investigators who investigated towing vessels after a reportable marine casualty. This brief study focused on the analysis of material failures that are the first events of marine casualties, specifically for the three types of uninspected towing vessels that are subject to the new rulemaking. These are: Towboats on rivers and other inland waters; tugs engaged in harbor operations, ship dockings & lightering barges; and tugs towing offshore barges on coastal routes. These material failures (as the 1st event) were analyzed from five years of investigation data, 2004-'08, and are not presented in any particular order.

FUEL FILTER

As a material failure, a fuel filter getting clogged with dirt, water or both dirt & water is more common on towing vessels than it is on other commercial vessels. Investigations of filter, purifier and/or separator failures indicate that these components need more attention (cleaning) than they are getting.

TOWLINE

The failure of a "towline" stands out as being the #1 item on the list. In many of these instances, the term "Towline" as the "Component Description" is referring to a facing wire. Additionally, as the term is used in our data, it also refers to any of the inter-barge connection wires; illustrated on the picture "Wires most Commonly Used and their Descriptive Names".* These wires are listed as components in the same sense that permanent parts of the vessel are components. In many instances, the failure of these wires is attributed to operator error in the handling of the boat or operator error on the part of the deck crew who might have fastened it incorrectly. It's also noted that, in some instances, the wire was either too small or it had been subject to too much wear & tear to be safe. Therefore, inspection of these towlines and training in their proper use is paramount. * Deckhand's Manual page 18.

STEERING GEAR

Linkage – We realize that the term "linkage" does not precisely identify a component in a steering system; as we cannot overemphasize the number of different mechanical connecting components that exist in a vessel's steering system.

Hose – Most hose failures are that of a burst somewhere along the length of the hose. Operators should always inspect for the warning signs of oxidation and chafing wear. Additionally, the crimped-on end fittings fail, occasionally, without warning.

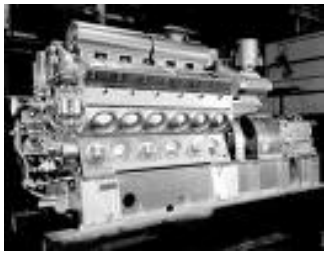
Rudder – Less than half of all rudder casualties are the direct result of groundings or flotsam strikes. The exact causes of most of these casualties are never attributed to one particular event. In over 20% of these casualties, the rudder has actually been lost. Having a diver inspect the rudder post and pintle, periodically, would be prudent.

Ram – Casualties related to this major component are both hydraulic and mechanical. The hydraulic failures are in common with other ram-actuated hydraulic machines: stuck pistons and blown seals. Mechanical failures are at parity with hydraulic failures, in that half of all ram-related failures involve the attachment of the ram to the rudder. Some of the mechanical failures could be considered structural failures, such as a disconnection of the ram from the rudder quadrant or the rudder post. We've seen threaded connection (nut/bolt) failures and weld failures.

Pump – The same mounting & connecting failures occur with the steering pumps as well as with the rams: 40%. Sixty percent of pump failures actually are with the pump internals: seals & bearings.

PROPULSION DIESEL

Concerning the failures of propulsion diesel internals, we compared the larger propulsion diesels with smaller engines



and concluded that they're at parity with each other for failures related to their cylinders and cylinder heads. The failures that require a power-pack replacement for a cylinder perhaps indicate the lack of maintenance monitoring programs that would allow for planned power-pack replacement. Concerning cylinder heads, better monitoring of valve operation would also mean that cylinder heads would be inspected for cracks and leaking gaskets as part of the program.

GOVERNOR

The one noteworthy external component of a propulsion diesel is its governor. A governor malfunction that allows an engine to overspeed usually results in engine shut-down. The three most common causes of governor malfunction are inadequate lubrication, improper adjustment of control linkage and loss of pneumatic pressure (control air) to the governor.

GENERATOR

Most of the failures that cause a towing vessel's diesel generator to stall or trip-off the line are related to the diesel end of the generator set. We have seen the same failures that we saw with propulsion diesels, in more-or-less the same proportions. Concerning the generator end of the set, the most common failure items are the voltage regulators and wires. The main leads and other wires should be inspected periodically; looking for cracked and/or oxidized insulation.

where equipment must be hard-wired is a common electrical deficiency. Exposed dead-end wires and missing junction-box or switch-plate covers account for 27% of the inspection deficiencies. Insufficient mounting of cables as they run along bulkheads is also a noted problem. Make sure that all junction boxes have their covers in place. (46 CFR 111.81) Operators should perform a self-inspection prior to scheduling the exam. (Electrical Regulations: 46 CFR 111.60)

VESSEL RESPONSE PLAN

With regard to towboats that push tank barges, the most common items that are either lacking from or not sufficiently addressed in the response plan are: (1) Certification that response resources are ensured under contract to respond, to the maximum extent possible, to a Worst Case Discharge; (2) Volume and type of oil that would be discharged in a Worst Case Discharge; (3) Responsibilities of the qualified individual for immediate communication with the NRC; (4) Vessel-specific information on the barges and the Captain of the Port Zone information for the areas in which the barges will be operated. Documentation of "Contract of other Approved Means of Spill Removal" must be on board. Response exercises and Qualified-Individual Notification exercises are required quarterly. Management Team exercises and Equipment Deployment exercises are required annually. Records of these exercises must be kept for three years. Owners/operators, who need to amend a Response Plan or submit a plan for approval, must use the "Homeport" web portal, http://homeport.uscg.mil - Log-in, click Help and navigate the "Homeport Plan Submitter". (33 CFR 155.1040, 155.1060)

GUARDS FOR EXPOSED HAZARDS

Missing guards for moving machinery is the most common deficiency in this category. 'Exposed Hazards' also includes battery boxes, exhaust pipes and heaters. Additionally, (hot surface) guards are sometimes missing from cooking appliances in the galley. Insulation missing from diesel engine exhaust piping is also a common finding.

VESSEL SECURITY PLAN

The Company Security Officer or the Vessel Security Officer must ensure that the Vessel Security Plan (VSP) is audited annually. The VSP must also be audited if the owner or operator of the vessel changes or if there has been any change in the operations of the vessel not addressed in the existing VSP (33 CFR 104.415). If the results of an audit indicate that the VSP must be amended, an amended VSP must be submitted to the Coast Guard's Marine Safety Center for review and approval (104.410). Plans may be submitted electronically through the Coast Guard's "Homeport" web portal after becoming a registered user. Vessel Security Officers must conduct at least one drill every three months while the vessel is in service. These drills must test individual elements of the VSP. Annual exercises are required to test communication & notification procedures and elements of resource availability, coordination and response (104.230). Records of drills, exercises and all other security activities must be kept for two years (104.235).

For more information about Commercial Vessel inspections and how you can prevent these common deficiencies, including performing your own self inspection, please contact your local Coast Guard Sector/Inspections Division. For a listing of local Sector Offices, click on "Sector Directory" on Homeport: http://homeport.uscg.mil

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UNITED STATES COAST GUARD

TOP 10 TOWING VESSEL DEFICIENCIES

PURPOSE

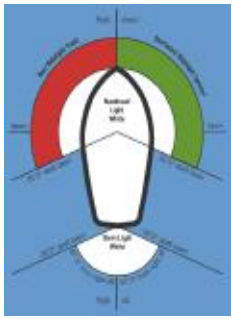
We conducted an analysis of all deficiencies recorded by CG field personnel while inspecting, investigating or boarding "uninspected towing vessels" (UTV) that have been required to meet the provisions of Subchapter C. The purpose of this analysis was to identify the ten most common deficiencies to assist UTV owners/operators identify and correct common problems.

The top ten deficiencies, including a brief explanation of the deficiency, applicable regulation, and potential correction methods are provided below. These deficiencies are not listed in any specific order.

GENERAL ALARM

General alarm installations in the engine room are required to include both audible and visual indicators (i.e., warning bell/siren and light). A placard with the inscription: "Attention General Alarm – When Alarm Sounds or Flashes, Go to Your Station" is required to be posted in the vicinity of the general alarm. Missing placards and visual indicators as well as inoperable audible indicators are frequent deficiencies on towing vessels. (46 CFR 27.201)

RUNNING LIGHTS



All vessels must have navigation lights in accordance with the International and Inland Navigation Rules. Many towing vessels are found to have inoperable stern, masthead, and sidelights. In some instances the installation of these lights was found to conflict with the International and Inland Navigation Rules, including the lack of "matte black" painting of the light screens. Vessels of 65 feet or more in length or 100 gross tons or more in size must also have navigation lights that are compliant with UL 1104 standards, as specified in the Electrical Regulations, Subchapter "J": 46 CFR 111.75-17(d). Vessel owners/operators should test their navigation lights prior to each voyage to ensure proper operation. Operators should inspect their running lights periodically, paying particular attention to the condition of the lenses, wattage and focal height of the light bulbs. The bulb's filament must be at the same height as the middle portion of the lens. Household bulbs are not acceptable. Navigation Rule 24 provides the running light requirements for towing vessels and Rule 22 gives the ranges of visibility over which the lights must be visible. (46 CFR 25.10-3)

REMOTE FUEL SHUT-OFF VALVES

Any fuel line that supplies fuel directly to a diesel engine must have a shut-off valve that can be remotely-operated from outside the space. All mechanical linkages for the valve must be kept clean and lubricated. The valve control must be labeled in one-inch letters. Owners/operators should ensure that the instructions are posted in the vicinity of the emergency fuel shut-off valve control. (46 CFR 27.207)

FIRE-DETECTING CONTROL PANEL

All of the control panel's required features must function properly: Power-available indicator light, audible alarm, visible indication of the zone (or zones) of the fire's origin, means to silence the audible alarm, and a circuit-fault detector test switch. Labels for all switches and indicators must be in place. Documentation that the system was certified (by either a registered professional engineer or a recognized classification society) should be on board. Owners/operators should be prepared to demonstrate proper operation during each examination or boarding. (46 CFR 27.203)

LIFE BUOYS

All life buoys must be marked in block capital letters with the name of the vessel and the vessel's hailing port. The information stated on the manufacturer's label in waterproof lettering, required by 46 CFR 160.050-6, must not be faded to the point that it is unreadable. Also, each life buoy stowage position must be marked with either the word LIFE BUOY or the life buoy symbol from IMO Resolution A.760(18). There are four different life buoy symbols; depending on how the buoy is equipped. Owners/operators should check that the required number of life buoys is equipped with 'self-igniting' lights, 'self-activated' smoke signals and that the buoyant line (typically polypropylene) is not oxidized from overexposure to the elements. (46 CFR 199.170(a))

FIRE PUMPS

Current regulations require a towing vessel to be equipped with a self-priming fire pump; which may be either fixed or portable. Owners whose vessels have fixed pumps should ensure that the pump has been fitted with a remote start control and that the control is in working order. If fire-main valves have to be operated from this remote location, ensure that the valves open properly. Portable pumps, along with the hose and nozzle, must be stowed outside of the machinery space. A fifty-foot hose is required. The portable pump must be considered to be a dedicated fire pump. It may not be used to pump oily mixtures. (46 CFR 27.301)

WIRING MATERIALS AND METHODS

Wires must be properly installed and connected in accordance with IEEE Std 45 sections 20 & 22 as well as IEC 92-3 and paragraph 8 of IEC 92-352. The use of temporary wiring