

NTSB: diesel generator engine failure

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The National Transportation Safety Board of the United States (NTSB) published "[Safer Seas Digest 2023](#)", which includes a number of incidents which may be of interest to IMCA members. This is one of them.

What happened?

An offshore supply vessel was conducting sea trials after a long period of maintenance, when its no. 3 main diesel generator engine suffered a mechanical failure that resulted in a fire in the engine room. The crew extinguished the fire before it could spread throughout the vessel. There were no injuries nor pollution reported, but damage to the vessel amounted to around \$1.1 million.

During the maintenance period, service technicians identified a standard-sized connecting rod bearing on the no. 3 main engine that did not meet the service company's specifications and, in accordance with their policy, replaced all the connecting rod bearings with standard-sized bearings. They also removed and inspected the no. 6 main bearing, which, unbeknownst to them, was undersized with a smaller inner diameter.

Because none of the connecting rod bearings they replaced had been machined, the technicians used standard-sized bearings to replace the no. 6 main bearing, since it was the service company's expectation that both main bearing journals and connecting rod bearing journals would be machined at the same time. There was no record of the main bearing's part number in the service technician's notes; therefore, the technician likely did not identify and record the part number. The service company's standard practice was to replace any removed bearings with new bearings, so a new standard-sized bearing was ordered and installed.

After maintenance was completed, sea trials were scheduled to test and ensure the proper operation of the vessel's engines, propulsion systems, and automatic power management system. During the tests, with the two stern thrusters about 75% load, and the no. 3 main engine about 30% load, the engineering crew in the ECR heard a "large bang" and observed smoke in the engine room. No. 3 main engine experienced a catastrophic mechanical failure. The no. 6 main bearing's incorrect size allowed lube oil to leak from the larger clearances of the bearing in the no. 3 main engine, thus decreasing the lube oil supply pressure to the adjacent nos. 9 and 10 connecting rod journal bearings. The loss of lube oil supply pressure resulted in a rapid temperature increase of the connecting bearings and subsequent fracturing of the bearing cap bolts on the nos. 9 and 10 connecting rods. As a result, several engine components broke free while the engine was running. These components were strewn about the crankcase, blew open the inspection cover and part of the engine block, and allowed hot oil and gas to start a fire in the engine room.

The crew's response to the fire was timely and effective. They quickly stopped the running engines, isolated all fuel supplies, shut down engine room ventilation systems, and closed the space's air dampers and watertight doors to effectively starve the fire of fuel and oxygen, thereby preventing its spread. After the captain called for help, tugboats quickly returned to the vessel to assist it as the crew fought the fire. Additionally, the crew activated the vessel's fixed CO2 fire extinguishing system, which effectively diminished and smothered the fire.

What was the (probable) cause?

Investigation revealed that the probable cause of the mechanical failure of the no. 3 main engine and resulting fire was the replacement of a crankshaft main bearing with an incorrectly sized bearing during a previous engine overhaul. Engine service technicians did not correctly identify the removed bearing's part number, which resulted in the loss of lube oil pressure in adjacent connecting rod bearings.

Lesson

When maintenance is performed, correct replacement of machinery components is critical to ensuring safe and reliable vessel operation. Vessel crews and equipment manufacturer technicians should carefully identify and document part numbers of all components removed from shipboard equipment. Tracking systems are an effective form of record-keeping that can be used to ensure proper replacement part selection for reinstallation.

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