

unassociated reasons. A summary of the actual problem reports for these inflight shutdowns and other events, which were submitted in compliance with paragraph (f) of these special conditions, is contained in Table 1. Had every one of those events resulted in an engine

inflight shutdown, the resulting IFSD rates for each engine type would have been significantly higher. Boeing, the engine manufacturers, the FAA, and other regulatory authorities worked together to prevent additional inflight occurrences of these failure types. The

actual inflight shutdown rates prove that these early in-service problems were successfully managed to maintain the safety of 777 ETOPS operations worldwide.

TABLE 1

Date occurred	EE-1 #	Engine type	Affected system	Event description
10/1/1995	101	PW	ENGINE—OIL PUMP.	Airplane diversion due to low oil quantity. Engine not shut down, but oil quantity indication went to zero. Related to LP01 problem.
5/19/1996	179	PW	ENGINE	Takeoff aborted due to EGT exceedance. A loose B-nut was found on the PS3 line to the 2.95 bleed valve, which caused erratic operation.
5/30/1996	181	PW	ENGINE	Air turnback due to high oil consumption. Oil wetness noted and corrected from previous flights. Consumption continued to be high.
8/24/1996	233	PW	ENGINE	IFSD—Inflight shutdown due to low oil pressure indication. Plastic shipping cap was left in the LPO1 oil line during installation as part of fleet up-grade.
10/5/1996	254	PW	ENGINE	IFSD—Engine was shut down due to low oil quantity and low oil pressure. Loose main oil line at filter housing. Repeat of oil line shipping cap problem.
10/11/1996	261	PW	ENGINE	Air turnback. Engine experienced high vibration during cruise. Vibration indication exceeded EICAS "Pop-up" level at 4.06.
3/26/1997	385	PW	ENGINE	Twelve quarts of oil lost after a series of training flights due to a leak of an oil line to the fuel/oil cooler. Oil loss took place over approximately 3 hours of flight time.
2/24/1997	G-65	GE	ENGINE GEAR-BOX.	Air turnback due to loss of right backup generator followed by engine oil filter EICAS message. Root cause was a failed gearbox backup generator pad bearing.
11/4/1997	G-84	GE	ENGINE	IFSD—Engine experienced a power loss during approach. A restart attempt was unsuccessful. Root cause was a sticking bypass valve in the hydromechanical unit (HMU).
11/9/1997	G-87	GE	ENGINE	Flight crew heard a surge toward the end of the takeoff roll and tower reported seeing flames from the engine. At 600 feet, the engine surged again. The flight crew reduced power and returned to the airport.
3/12/1998	G-96	GE	ENGINE	Pilot heard a bang and a tower reported fire from the tailpipe after power was set for takeoff. The takeoff was aborted. Metal was found in the tailpipe.
6/22/1998	G-108	GE	ENGINE	IFSD—After takeoff, the pilot received low oil pressure and low oil quantity indications. The pilot shut down the engine. Two of four oil filter cover bolts were loose due to inserts pulling out of the filter housing casting.
7/1/1998	G-110	GE	ENGINE	IFSD—Uncommanded engine inflight shutdown during cruise at flight level 370. Flight crew noted a rapid loss of oil pressure and N2. Root cause was a Number 3 bearing failure.
7/22/1998	G-112	GE	ENGINE	IFSD—During cruise, EICAS indication of low oil quantity. Pilot shut down the engine. Oil filter housing cover bolts were over-torqued resulting in stripped threads in the oil filter housing inserts.
11/20/1998	G-120	GE	IDG installation	IFSD—Crew started return to departure airport due to indication of complete oil loss. Engine was subsequently shut down when oil pressure dropped to 10 psi. The integrated drive generator (IDG) packing was damaged during installation.
10/11/1996	R-63	RR	ENGINE—RADIAL DRIVE SHROUD.	Flight diverted after crew observed right engine oil quantity loss approx. 5 hours into flight. Found cracked upper radial drive shroud.
10/11/1996	R-64	RR	ENGINE—FUEL NOZZLE.	Fuel found leaking from Zone 2 during investigation of R-63 oil loss. Source of fuel leak was a cracked weld on the No. 24 fuel nozzle (top dead center).
10/25/1996	R-65	RR	ENGINE—RADIAL DRIVE SHROUD.	After engine shutdown at the gate, the right engine oil quantity indicated 9 qts. Upper radial drive shroud found cracked.
11/12/1996	R-67	RR	ENGINE	"ENGINE OIL PRESS R" EICAS message displayed after landing. Engine shut down. Oil pump drive shaft found sheared.
1/26/1997	R-91	RR	ENGINE—STEP ASIDE GEAR-BOX.	Low oil quantity caused by crack in step aside gearbox housing approximately 4 to 5 inches long.
5/24/1997	R-109	RR	ENGINE	Engine was shut down on takeoff following high power surge. Subsequent borescope inspection revealed HPC rotor 1 blade failure caused by foreign object damage that was consistent with blade damage noted on 5/20/97 inspection.
7/7/1997	R-112	RR	ENGINE	Aircraft diversion caused by excessive oil leakage due to incorrectly installed lower bevel box O-ring seal following radial drive shaft replacement.
7/26/1997	—	RR	ENGINE	Aircraft diversion due to high oil consumption. Not related to step aside gearbox housing cracking problem.