

EDMS *Reference Manual Supplement*

-Model Changes between EDMS 4.21 and EDMS 4.3-

July 18, 2005

Aircraft Engine Particulate Mater (PM) Emissions

Change	Effect
<u>System Database</u> The system table, ENG_EI.DBF, in EDMS 4.3 includes smoke numbers for aircraft engines which are used to compute PM emission indices via a first-order approximating equation.	Users can model PM emissions from many commercial aircraft engines using the First Order Approximation (FOA) version 2.0 methodology. Attachment A to this user manual supplement provides a complete list of the engines where an estimate of PM is available. The FOA is applicable for engines that have both smoke number and fuel flow information for each mode. As a result, the FOA is not applicable to most piston, turboprop and military engines. A note will appear in the emissions inventory report and the AERMOD input file if system engines are used that do not have smoke numbers associated with them.
<u>User-Created Aircraft</u> EDMS 4.3 allows users to edit PM emission indices with the User-Created Aircraft utility window.	Users can create user-created aircraft with PM emissions. Moreover, users can create aircraft with an engine based on a system engine whose PM data is currently unavailable and supplement the data with their own PM emission indices.

Dispersion Analyses

Change	Effect
<u>Stationary Sources</u> In EDMS 4.21, an integer arithmetic error causes all emission rates for stationary sources to erroneously be zero. Version 4.3 corrects the computations.	Dispersion analyses use the correct stationary source emission rates.
<u>Taxiways</u> In EDMS 4.21, the correct speeds for taxiways used for the configuration in effect are not retrieved; and often zero miles per hour is used erroneously instead, causing infinite emissions. This resulted in an error message being reported by AERMOD. Version 4.3 corrects this error.	Dispersion analyses refer to the correct taxiway speeds for taxiways used in configurations.

Operational Profiles

Change	Effect
In EDMS 4.21, editing the weights of any operational profile already in use does not update the total annual operations necessary for correctly determining an emissions inventory. Version 4.3 automatically updates the annual operation counts.	Emission inventories use the correct number of annual operations after the operational profile weights have been changed.

Parking Facilities

Change

In EDMS 4.21, user-edited values for the PM-10 and PM-2.5 emission factors are not saved correctly. Version 4.3 corrects this problem.

Effect

Emission inventories reflect the user-edited emission factors for parking facilities.

Stationary Sources

Change

Units of Measure

Previously, the units of measure displayed on screen for fuel tanks and aircraft engine testing were “metric tons.” EDMS 4.3 displays the correct units used by EDMS: “kiloliters” and “test cycles” for fuel tanks and aircraft engine testing, respectively.

Effect

EDMS now displays the correct input units for fuel tanks and aircraft engine testing. Because the change is cosmetic, there is no impact to emission or dispersion results.

Fuel Tank Liquid Temperature

In EDMS 4.2 and 4.21, the liquid temperature of fuel tanks was modeled as 1.3°F above the annual average ambient temperature, when it should have been 1.8°F. Version 4.3 corrects this oversight.

Emissions factors for fuel tanks are computed more consistently with EPA methodology; however, there is negligible impact on results.

System Database

Change

Added Aircraft Engines

EDMS 4.3 includes emissions data from issue 14 of the ICAO databank for the following aircraft engines:

- PW6122A & PW6124A
- GE90-110B1, -113B & -115B

Effect

Users have increased functionality in modeling emissions from new aircraft.

Deleted Aircraft Engines

EDMS 4.3 no longer contains the following aircraft engines in its system database due to the engine data being superseded by more recent test data:

- AE3007A1, AE3007A1/1 & AE3007A1/2
- AE3007C & AE3007C1
- CF6-80C2A2 old comb
- CF6-80C2A3 old comb
- CF6-80C2A5 old comb
- CF6-80C2B1F old comb
- GE90-110B
- PW2037 original data
- PW2040 original data
- RB211-524G original
- RB211-535E4 original
- RB211-535E4 revised

These engines have been removed from the EDMS system tables. Users are unable to select these engines.

Aircraft Categorization

EDMS 4.21 erroneously categorized the “PA-31T Cheyenne” aircraft as piston-power, and the “FT337P” as a turboprop. EDMS 4.3 correctly categorizes the Cheyenne as a turboprop and the

EDMS contains more accurate aircraft categorization.

FT337P as piston-powered.

Attachment A

EDMS 4.3 Engines with PM Emissions

ICAO UID No	Engine Identification	Combustor Description
	Allison Engine Company / Rolls-Royce Corporation	
4AL003	AE3007A	
6AL005	AE3007A1	Type 1
6AL006	AE3007A1	Type 2
6AL007	AE3007A1	Type 3 (reduced emissions)
6AL008	AE3007A1/1	Type 1
6AL009	AE3007A1/1	Type 2
6AL010	AE3007A1/1	Type 3 (reduced emissions)
6AL011	AE3007A1/3	Type 1
6AL012	AE3007A1/3	Type 2
6AL013	AE3007A1/3	Type 3 (reduced emissions)
6AL014	AE3007A1P	Type 1
6AL015	AE3007A1P	Type 2
6AL016	AE3007A1P	Type 3 (reduced emissions)
6AL017	AE3007A3	Type 1
6AL018	AE3007A3	Type 2
6AL019	AE3007A3	Type 3 (reduced emissions)
6AL020	AE3007A1E	Type 3
6AL021	AE3007C	Type 1
6AL022	AE3007C	Type 2
6AL023	AE3007C1	Type 1
6AL024	AE3007C1	Type 2
	AO 'Aviadgatel'	
1AA001	D-30 (II series)	
1AA002	D-30KP-2	
1AA003	D-30KU	
1AA005	PS-90A	
	BMW Roll-Royce	
3BR001	BR700-710A1-10	
4BR008	BR700-710A1-10	
4BR009	BR700-710A2-20	
6BR010	BR700-710-C4-11	Annular
4BR002	BR700-715A1-30	
4BR005	BR700-715A1-30	Improved fuel injector
4BR003	BR700-715B1-30	
4BR006	BR700-715B1-30	Improved fuel injector
4BR004	BR700-715C1-30	
4BR007	BR700-715C1-30	Improved fuel injector
	CFM International	
1CM001	CFM56-2A series	
1CM002	CFM56-2B-1	
1CM004	CFM56-3-B1	
1CM005	CFM56-3B-2	
1CM006	CFM56-3C-1 (Rerated)	
1CM007	CFM56-3C-1	

ICAO UID No	Engine Identification	Combustor Description
1CM008	CFM56-5-A1	
1CM009	CFM56-5A3	
4CM035	CFM56-5A4	
4CM036	CFM56-5A5	
2CM012	CFM56-5B1	
2CM016	CFM56-5B1/2	DAC
3CM020	CFM56-5B1/2P	DAC-II
3CM023	CFM56-5B1/P	
2CM013	CFM56-5B2	
2CM017	CFM56-5B2/2	DAC
4CM037	CFM56-5B2/2P	DAC-II
3CM024	CFM56-5B2/P	
4CM038	CFM56-5B3/2P	DAC-II
3CM025	CFM56-5B3/P	
2CM014	CFM56-5B4	
2CM018	CFM56-5B4/2	DAC
3CM021	CFM56-5B4/2P	DAC-II
3CM026	CFM56-5B4/P	
3CM027	CFM56-5B5/P	
2CM019	CFM56-5B6/2	DAC
3CM022	CFM56-5B6/2P	DAC-II
3CM028	CFM56-5B6/P	
6CM044	CFM56-5B7/P	
7CM048	CFM56-5B8/P	SAC
7CM050	CFM56-5B9/2P	DAC
7CM049	CFM56-5B9/P	SAC
1CM010	CFM56-5C2	
7CM045	CFM56-5C2/P	SAC
1CM011	CFM56-5C3	
7CM046	CFM56-5C3/P	SAC
2CM015	CFM56-5C4	
7CM047	CFM56-5C4/P	SAC
3CM029	CFM56-7B18	
3CM030	CFM56-7B20	
4CM039	CFM56-7B20/2	
3CM031	CFM56-7B22	
4CM040	CFM56-7B22/2	
3CM032	CFM56-7B24	
4CM041	CFM56-7B24/2	
3CM033	CFM56-7B26	
4CM042	CFM56-7B26/2	
3CM034	CFM56-7B27	
4CM043	CFM56-7B27/2	
General Electric		
1GE034	CF34-3A	LEC II
1GE035	CF34-3A1	LEC II
5GE084	CF34-3B	
5GE083	CF34-8C1	
6GE096	CF34-8C1 Block 1	LEC
6GE092	CF34-8C5	LEC

ICAO UID No	Engine Identification	Combustor Description
6GE093	CF34-8E2	LEC
6GE094	CF34-8E5	LEC
6GE095	CF34-8E5A1	LEC
3GE067	CF6-45A	Low emissions fuel nozzle
1GE005	CF6-45A2	
3GE068	CF6-45A2	Low emissions fuel nozzle
3GE069	CF6-50A	Low emissions fuel nozzle
1GE006	CF6-50C	
3GE070	CF6-50C	Low emissions fuel nozzle
3GE073	CF6-50C1	Low emissions fuel nozzle
1GE007	CF6-50C1, -C2	
3GE074	CF6-50C2	Low emissions fuel nozzle
3GE078	CF6-50C2B	Low emissions fuel nozzle
1GE008	CF6-50C2R	
3GE072	CF6-50C2R	Low emissions fuel nozzle
3GE071	CF6-50CA	Low emissions fuel nozzle
3GE075	CF6-50E	Low emissions fuel nozzle
3GE076	CF6-50E1	Low emissions fuel nozzle
1GE009	CF6-50E2	
3GE077	CF6-50E2	Low emissions fuel nozzle
3GE079	CF6-50E2B	Low emissions fuel nozzle
1GE001	CF6-6D	
1GE002	CF6-6D1A	
1GE003	CF6-6K	
1GE004	CF6-6K2	
1GE010	CF6-80A	
1GE011	CF6-80A1	
1GE012	CF6-80A2	
1GE013	CF6-80A3	
1GE014	CF6-80C2A1	
2GE036	CF6-80C2A1	1862M39
1GE016	CF6-80C2A2	
2GE037	CF6-80C2A2	1862M39
1GE018	CF6-80C2A3	
2GE038	CF6-80C2A3	1862M39
1GE020	CF6-80C2A5	
2GE039	CF6-80C2A5	1862M39
3GE056	CF6-80C2A5F	1862M39
1GE021	CF6-80C2A8	
2GE040	CF6-80C2A8	1862M39
1GE022	CF6-80C2B1	
2GE041	CF6-80C2B1	1862M39
1GE024	CF6-80C2B1F	
2GE045	CF6-80C2B1F	1862M39
1GE025	CF6-80C2B2	
2GE042	CF6-80C2B2	1862M39
1GE026	CF6-80C2B2F	
2GE046	CF6-80C2B2F	1862M39
1GE027	CF6-80C2B4	
2GE043	CF6-80C2B4	1862M39
1GE028	CF6-80C2B4F	

ICAO UID No	Engine Identification	Combustor Description
2GE047	CF6-80C2B4F	1862M39
3GE057	CF6-80C2B5F	1862M39
1GE029	CF6-80C2B6	
2GE044	CF6-80C2B6	1862M39
1GE030	CF6-80C2B6F	
2GE048	CF6-80C2B6F	1862M39
2GE054	CF6-80C2B7F	
2GE055	CF6-80C2B7F	1862M39
3GE058	CF6-80C2B8FA	1862M39
1GE031	CF6-80C2D1F	
2GE049	CF6-80C2D1F	1862M39
1GE032	CF6-80E1A1	
2GE050	CF6-80E1A1	1862M39
1GE033	CF6-80E1A2	
2GE051	CF6-80E1A2	1862M39
5GE085	CF6-80E1A3	Standard
4GE080	CF6-80E1A4	Standard
4GE081	CF6-80E1A4	Low emissions
3GE062	GE90-76B	DAC II
5GE086	GE90-76B	
6GE087	GE90-76B	DAC II
3GE063	GE90-77B	DAC II
6GE088	GE90-77B	DAC II
3GE064	GE90-85B	DAC II
6GE089	GE90-85B	DAC II
3GE060	GE90-90B	DAC I
3GE065	GE90-90B	DAC II
6GE090	GE90-90B	DAC II
3GE061	GE90-92B	DAC I
3GE066	GE90-92B	DAC II
6GE091	GE90-94B	DAC II
7GE097	GE90-110B1	DAC
7GE098	GE90-113B	DAC
7GE099	GE90-115B	DAC
International Aero Engines		
1IA001	V2500-A1	
3IA006	V2522-A5	
3IA007	V2524-A5	
1IA002	V2525-D5	
1IA003	V2527-A5	
1IA004	V2528-D5	
1IA005	V2530-A5	
3IA008	V2533-A5	
KKBM		
1KK001	NK-8-2U	
1KK003	NK-86	
1KK005	NK-86MA	

ICAO UID No	Engine Identification	Combustor Description
	Pratt & Whitney Aircraft Group	
1PW035	JT15D-1 series	
1PW036	JT15D-4 series	
1PW037	JT15D-5, -5A, -5B	
1PW038	JT15D-5C	
1PW001	JT3D-3B	
1PW003	JT3D-7 series	Smoke fix 14-70KC
1PW002	JT3D-7 series	14-57D
1PW008	JT8D-11	
1PW010	JT8D-15	Reduced emissions
1PW009	JT8D-15	Smoke fix
1PW011	JT8D-15A	
1PW013	JT8D-17	Reduced emissions
1PW012	JT8D-17	Smoke fix
1PW014	JT8D-17A	
1PW015	JT8D-17AR	
1PW016	JT8D-17R	
1PW017	JT8D-209	
4PW068	JT8D-217	Environmental Kit (E_Kit)
1PW018	JT8D-217 series	
4PW069	JT8D-217A	Environmental Kit (E_Kit)
4PW070	JT8D-217C	Environmental Kit (E_Kit)
4PW071	JT8D-219	Environmental Kit (E_Kit)
1PW019	JT8D-219	
1PW005	JT8D-7 series	Reduced emissions
1PW004	JT8D-7 series	Smoke fix
1PW007	JT8D-9 series	Reduced emissions
1PW006	JT8D-9 series	Smoke fix
1PW032	JT9D-20J	
1PW033	JT9D-59A	
1PW020	JT9D-7	
1PW034	JT9D-70A	
1PW021	JT9D-7A	
1PW022	JT9D-7F	Mod V
1PW023	JT9D-7F	Mod VI
1PW024	JT9D-7J	
1PW025	JT9D-7Q	
1PW026	JT9D-7R4D, -7R4D1	
1PW027	JT9D-7R4E, -7R4E1	
1PW028	JT9D-7R4E4, -E1(H)	
1PW029	JT9D-7R4G2	
1PW030	JT9D-7R4H1	
4PW072	PW2037	
4PW073	PW2040	
7PW077	PW306A	Annular
7PW078	PW306B	Annular
7PW079	PW308A	Annular
7PW080	PW308C	Annular
1PW042	PW4056	Reduced emissions
1PW041	PW4056	
1PW043	PW4060	Reduced emissions

ICAO UID No	Engine Identification	Combustor Description
2PW060	PW4074	
2PW061	PW4077	
3PW064	PW4077D	
2PW062	PW4084	
3PW065	PW4084D	
3PW066	PW4090	
5PW076	PW4098	
1PW045	PW4152	Reduced smoke
1PW044	PW4152	
1PW047	PW4156	Reduced smoke
1PW046	PW4156	
1PW048	PW4158	Reduced smoke
1PW049	PW4164	Floatwall
7PW081	PW4164	Talon II
1PW050	PW4168	Floatwall
5PW075	PW4168	Talon II
4PW067	PW4168A	Floatwall
7PW082	PW4168A	Talon II
1PW052	PW4460	Reduced smoke
1PW053	PW4x50	Phase 3
1PW054	PW4x52	Phase 3
1PW055	PW4x56	Phase 3
1PW056	PW4x58	Phase 3
5PW074	PW4X58	Talon II
1PW057	PW4x60	Phase 3
1PW059	PW4x62	Phase 3
1PW058	PW4x62	Reduced smoke
7PW083	PW6122A	Talon II
7PW084	PW6124A	Talon II
Rolls-Royce Ltd		
1RR001	M45H-01	
1RR002	RB211-22B	Package 1
1RR003	RB211-22B	Package 1
1RR004	RB211-524B series	Package 1
1RR005	RB211-524B series	Phase 2
1RR006	RB211-524C2	Package 1
1RR007	RB211-524D4	Package 1
1RR008	RB211-524D4	Phase 2
1RR010	RB211-524G	
4RR036	RB211-524G-T	
1RR011	RB211-524H	
4RR037	RB211-524H-T	
1RR012	RB211-535C	
3RR028	RB211-535E4	
5RR038	RB211-535E4	Phase 5
3RR034	RB211-535E4B	
5RR039	RB211-535E4B	Phase 5
1RR015	SPEY Mk511	
1RR016	SPEY Mk511	Transply IIIH
3RR031	TAY 650	Pedhead

ICAO UID No	Engine Identification	Combustor Description
3RR032	TAY 651	Pedhead
3RR033	TAY 651	Transply
1RR019	TAY Mk611-8	
6RR042	TAY 611-8C	Transply IIJ
1RR020	TAY Mk620-15	
1RR021	TAY Mk650-15	
6RR041	Trent 556-61	Phase 5 tiled
3RR029	Trent 768	Improved traverse
3RR030	Trent 772	Improved traverse
2RR024	Trent 875	
2RR025	Trent 877	
2RR026	Trent 884	
2RR027	Trent 892	
5RR040	Trent 895	
Textron Lycoming		
1TL001	ALF 502L-2	
1TL002	ALF 502R-3	
1TL003	ALF 502R-5	
1TL004	LF507-1F, -1H	
ZMKB		
1ZM001	D-36	