

2020-02-19 16-11-04 Z-engine with Extra Exhaust valve
 Mode: #10 : ; : Optimiz.: SFC = F(CR, m_f.B, SOC_C, EVO, EPC, IVO, Int_Dur,
 EEVO, e.Exh_dur, PR_C.hp, PR_C.lp, PR_T.lp, EGR_LP)
 Title:
 www.diesel-rk.com
 Fuel: Diesel No. 2

----- PARAMETERS OF ENGINE WITH TURBOCOMPAUNDING OR SUPERCHARGING -----

27.635	- P_ovrl	- Overall Power with account of geared units, kW
-2.6756	- dP_add	- Power added by geared Turb/Comp/TC/EGR compressor, kW
175.94	- Torq_ovrl	- Overall Torque in view of geared T/C/TC/EGR_comp., N m
13.745	- BMEP_ovrl	- Overall BMEP, bar
0.14981	- SFC_ovrl	- Overall Specific Fuel Consumption, kg/kWh
0.14492	- SFC_o.ISO	- Same Specific Fuel Consumption but in ISO, kg/kWh
0.54615	- Eta_ovrl	- Overall Engine Efficiency
10.0000	- R_gear	- Gear ratio of TK speed reducer
1.00000	- Eta_mC.hp	- Mechanical Efficiency of HPC
-2.6952	- dPdrv_hp	- Power added by geared Unit of HP stage, kW
10.0000	- R_gear.lp	- Gear Ratio of LP Units and drive shaft coupling
1.00000	- Eta_mC.lp	- Mechanical Efficiency of LP Compressor
0.01953	- dPdrv_lp	- Power added by geared Unit of LP stage, kW

----- PARAMETERS OF EFFICIENCY AND POWER -----

1500.0	- RPM	- Engine Speed, rev/min
30.311	- P_eng	- Piston Engine Power, kW
15.075	- BMEP	- Brake Mean Effective Pressure, bar
192.98	- Torque	- Brake Torque, N m
4.1400	- MFR	- Mass Flow Rate of the (Fuel) System, kg/h
0.02300	- m_f	- Mass of Fuel Supplied per cycle, g
0.02370	- m_f_42.7	- Cycle Fuel Mass of all fuels given to diesel (42.7 MJ/kg)
0.13659	- SFC	- Specific Fuel Consumption, kg/kWh
0.13213	- SFC_ISO	- Specific Fuel Consumption in ISO, kg/kWh
0.59902	- Eta_f	- Efficiency of piston engine
15.826	- IMEP	- Indicated Mean Effective Pressure, bar
0.62884	- Eta_i	- Indicated Efficiency
4.0000	- Sp	- Mean Piston Speed, m/s
0.75044	- FMEP	- Friction Mean Effective Pressure, bar (MAHLE data)
0.95258	- Eta_m	- Mechanical Efficiency of Piston Engine

----- ENVIRONMENTAL PARAMETERS -----

1.00000	- po_amb	- Total Ambient Pressure, bar
293.00	- To_amb	- (20 C) Total Ambient Temperature, K
1.0200	- p_Te	- Exhaust Back Pressure, bar (after turbine)
0.99000	- po_afltr	- Total Pressure after Induction Air Filter, bar
30.000	- Psi_H2O%	- Relative Air Humidity, %
0.00434	- H2O_vap.o	- H2O Mass Fraction in the ambient Air

----- EXHAUST GAS RECIRCULATION SYSTEM (LP) -----

0.08333	- EGR_lp	- Exhaust Gas Recirculation Ratio in LP system
1.0200	- p_egr.o	- Pressure in the Line Supplying EGR, bar
585.68	- T_egr.o	- (313 C) Temperature in the Line Supplying EGR, K
EGR Cooler #1 : dT= 267.4 K dp= 0.020 bar t_coolant= 36 C Ef=0.97		
0.06270	- H2O_vAfC	- H2O Steam Fraction in EGR after EGR cooler
0.01433	- H2O_wAfC	- H2O Liquid Fraction in EGR after EGR cooler
0.01011	- H2O_vCo	- H2O Steam Fract. in EGR+Air mixture before Compressor
0.18226E-03	- H2O_wCo	- H2O Liquid Frac. in EGR+Air mixture before Compressor
0.01000	- dp_egr.lp	- D.P. btw cooled EGR and intake air pipe, bar
318.27	- T_egr.lp	- (45 C) EGR Temperature before mixing, K
0.00160	- m_egr	- Exhaust Gas Recirculation Flow Rate, kg/s
0.04814	- C_s.egr	- Stoichiom. Burned Gas Fraction after mixing
286.55	- T_mix	- (13 C) Temperature of Air and EGR mixture, K
0.99000	- p_mix	- Pressure of Air and EGR mixture, bar
0.01947	- m_air+egr	- Mass Airflow + EGR through Engine Cylinders, kg/s
0.02062	- m_gas+egr	- Mass Exhaust Gasflow from Engine Cylinders, kg/s

----- TURBOCHARGING AND GAS EXCHANGE -----

6.9720	- p_C	- Pressure before Inlet Manifold, bar
314.10	- T_C	- (41 C) Temperature before Inlet Manifold, K
0.01785	- m_air	- Total Mass Intake Airflow of the Engine, kg/s
0.78676	- Eta_TC	- Turbocharger Efficiency
2.1639	- po_T	- Average Total Turbine Inlet Pressure, bar

683.08	- To_T	- (410 C) Average Total Turbine Inlet Temperature, K
0.01900	- m_gas	- Total Mass Exhaust Gasflow of the Engine, kg/s
1.1683	- A/F_eq.t	- Total Air Fuel Equivalence Ratio (Lambda)
0.85592	- F/A_eq.t	- Total Fuel Air Equivalence Ratio
0.15325	- Eta_v	- Volumetric Efficiency
0.32064	- x_r	- Residual Gas Mass Fraction
0.79640	- Phi	- Coeff. of Scavenging (Delivery Ratio / Eta_v)
0.0000	- BF_int	- Burnt Gas Fraction Backflowed into the Intake, %
0.0000	- %Blow-by	- % of Blow-by through piston rings
0.02208	- H2O_vap	- H2O Vapor Fract. in Cyl. Air after Gasexchange
0.0000	- H2O_liq	- H2O Liquid Fract. in Cyl. Air after Gasexchange

----- INTAKE SYSTEM -----

0.99999	- Sig_pint	- Pressure Ratio in a Unit before Intake Manifold
6.9673	- p_int	- Average Intake Manifold Pressure, bar
310.74	- T_int	- (38 C) Average Intake Manifold Temperature, K
0.32081	- v_int	- Average Gas Velocity in intake manifold, m/s
300.00	- Tw_int	- (27 C) Average Intake Manifold Wall Temperature, K
103.92	- hc_int	- Heat Transfer Coeff. in Intake Manifold, W/(m2*K)
280.00	- Tw_int.p	- (7 C) Average Intake Port Wall Temperature, K
223.33	- hc_int.p	- Heat Transfer Coeff. in Intake Port, W/(m2*K)
0.00614	- H2O_vap	- H2O Vapor Fract. in Air of Intake Manifold (average)
0.00461	- H2O_liq	- H2O Liquid Fract. in Air of Intake Manif. (average)
12.979	- A_v.thrt	- Total Effective Valve Port Throat Area, cm2

Valve Dim. Estim.: Num=2 Dv= 35.0 Dt= 30.0 Ds= 5.5 Lv= 7.1 Lv_desig= 8.8 mm

----- EXHAUST SYSTEM -----

2.1391	- p_exh	- Average Exhaust Manifold Gas Pressure, bar
661.23	- T_exh	- (388 C) Average Exhaust Manifold Gas Temperature, K
0.34403	- v_exh	- Average Gas Velocity in exhaust manifold, m/s
86.988	- Sh	- Strouhal number: Sh=a*Tau/L (has to be: Sh > 8)
625.60	- Tw_exh	- (352 C) Average Exhaust Manifold Wall Temperature, K
94.201	- hc_exh	- Heat Transfer Coeff. in Exhaust Manifold, W/(m2*K)
164.52	- hc_exh.p	- Heat Transfer Coeff. in Exhaust Port, W/(m2*K)
0.0000	- H2O_vap	- H2O Vapor Fract. in Gas of Exhaust Manif. (average)
0.0000	- H2O_liq	- H2O Liquid Fract. in Gas of Exh. Manif. (average)
4.7360	- A_v.thrt	- Total Effective Valve Port Throat Area, cm2

Valve Dim. Estim.: Num=1 Dv= 32.0 Dt= 28.0 Ds= 5.5 Lv= 12.8 Lv_desig= 8.0 mm

----- SYSTEM OF EXTRA EXHAUST -----

15.000	- EEVO	- Extra Exhaust Valve Opening, CA deg. ABDC
83.000	- EEVC	- Extra Exhaust Valve Closing, CA deg. ABDC
40.000	- d_e.ex.0	- Extra Exh. Manifold Exit Orifice Diameter, mm
1.0713	- p_e.exh	- Average Pressure in Extra Exh. Manifold, bar
530.86	- T_e.exh	- (258 C) Aver. Temper. in EE Manif., K
144.30	- m_e.exh%	- Fraction [%] of gas exhausted via Extra system.
0.02976	- m_e.exh	- Mass flow rate trough Extra Exhaust system, kg/s
457.29	- Tw_ee	- (184 C) Aver. Wall Temperat. of EE Manifold, K

Valve parameters: Num=1 Dv= 29.0 Dt= 25.0 Ds= 5.0 Lv= 10.0 Lv_desig= 10.0 mm

----- INJECTION OF MAIN FUEL SYSTEM "A" -----

Fuel:	Diesel No. 2	C:0.870 H:0.126 O:0.004
System:	Pintle type injector	1 inj: 44 x 0.085 x 76.0
3.9600	- MFR	- Mass Flow Rate of the (Fuel) System, kg/h
0.02200	- m_f	- Cycle mass delivered by the system , g
0.95652	- E_f_frac	- Fraction of Energy Supplied by this Fuel System
286.56	- p_inj.max	- Max. Sac Injection Pres. (before nozzles), bar
91.587	- p_inj.avr	- Mean Sac Press. for Total Fuel Portion, bar
4.0000	- N_pilots	- Number of injected portions
14.922	- d_32	- Sauter Mean Diameter of Drops, microns
39.683	- d_32.LD	- Diam. of Large Drops formed at inject. end, micron
80.000	- SOI	- Start of Injection or Ignition Timing, deg. B.TDC
14.200	- Dur_inj	- Duration of Injection, CA deg.
1.00000	- Phi_d1	- Durat. of First Phase of Fuel Flow Rise, deg.
1.00000	- Phi_d2	- Durat. of Secnd Phase of Fuel Flow Rise, deg.
0.50000	- C_inflex	- Rated Highness of F.Flow Rise Curve Inflexion
84.014	- Delay_ig	- Selfi-Ignition Delay Period (theoretic), deg. integral calculation by CHEMKIN for Diesel Oil
81.621	- Delay_ig	- Selfi-Ignition Delay Period (real), deg.
-1.6210	- SOC	- Start of Combust. if no external ign., deg.B.TDC
-4.5997	- SOC_Ex.Ig	- Start of Combust. with external ign., deg. B.TDC
0.99378	- x_Ev.Ig.D	- Fuel Mass Fraction Evaporated during Ignit. Delay

15.200 - Phi_z - Combustion Duration for this fuel system, deg.

----- INJECTION OF FUEL: SYSTEM "B" -----

Matter: H2O Inj. into Intake Port
System: Custom Fuel System
2.5200 - MFR - Mass Flow Rate of the (Fuel) System, kg/h
0.01400 - m_f - Cycle mass delivered by the system , g
0.59071 - H2O/fuel - H2O mass rated to equiv. mass of diesel oil (42.7 MJ/kg)
51.000 - SOI - Start of Injection or Ignition Timing, deg. B.TDC
1.00000 - Dur_inj - Duration of Injection, CA deg.

----- INJECTION OF FUEL: SYSTEM "C" -----

Fuel: Diesel No. 2 C:0.870 H:0.126 O:0.004
System: Hole type injector 1 inj: 1 x 0.200 x 84.0
0.18000 - MFR - Mass Flow Rate of the (Fuel) System, kg/h
0.10000E-02 - m_f - Cycle mass delivered by the system , g
0.04348 - E_f_frac - Fraction of Energy Supplied by this Fuel System
369.33 - p_inj.max - Max. Sac Injection Pres. (before nozzles), bar
155.64 - p_inj.avr - Mean Sac Press. for Total Fuel Portion, bar
1.00000 - N_pilots - Number of injected portions
22.026 - d_32 - Sauter Mean Diameter of Drops, microns
54.820 - d_32.LD - Diam. of Large Drops formed at inject. end, micron
20.000 - SOI - Start of Injection or Ignition Timing, deg. B.TDC
3.0000 - Dur_inj - Duration of Injection, CA deg.
1.00000 - Phi_d1 - Durat. of First Phase of Fuel Flow Rise, deg.
1.00000 - Phi_d2 - Durat. of Secnd Phase of Fuel Flow Rise, deg.
0.50000 - C_inflex - Rated Highness of F.Flow Rise Curve Inflexion
24.169 - Delay_ig - Selfi-Ignition Delay Period (theoretic), deg.
integral calculation by CHEMKIN for Diesel Oil
21.621 - Delay_ig - Selfi-Ignition Delay Period (real), deg.
-1.6210 - SOC - Start of Combust. if no external ign., deg.B.TDC
-3.1497 - SOC_Ex.Ig - Start of Combust. with external ign., deg. B.TDC
0.99190 - x_Ev.Ig.D - Fuel Mass Fraction Evaporated during Ignit. Delay
71.251 - Phi_z - Combustion Duration for this fuel system, deg.

----- COMBUSTION -----

1.8872 - A/F_eq - Air Fuel Equival. Ratio (Lambda) in the Cylinder
0.52989 - F/A_eq - Fuel Air Equivalence Ratio in the Cylinder
226.02 - p_max - Maximum Cylinder Pressure, bar
1772.4 - T_max - (1499 C) Maximum Cylinder Temperature, K
10.0000 - CA_p.max - Angle of Max. Cylinder Pressure, deg. A.TDC
12.000 - CA_t.max - Angle of Max. Cylinder Temperature, deg. A.TDC
7.8124 - dp/dTheta - Max. Rate of Pressure Rise, bar/deg.
1.6659 - Ring_Intn - Ringing / Knock Intensity, MW/m2
11509. - F_max - Max. Gas Force acting on the piston, kg
-3.1497 - SOC - Start of Combustion (total), deg. B.TDC
14.346 - Phi_z - Combustion Duration (for 99% of fuel), deg.
Phi_z 5%= 3.2; Phi_z 50%= 6.2; Phi_z 95%= 11.1
2.1061 - Rs_tdc - Swirl Ratio in the Combustion Chamber at TDC
2.0000 - Rs_ivc - Swirl Ratio in the Cylinder at IVC
10.472 - W_swirl - Max. Air Swirl Velocity, m/s at cylinder R= 32
0.03236 - H2O_vap - H2O Vapor Fract. in Cyl. Air before Combustion
0.0000 - H2O_liq - H2O Liquid Fract. in Cyl. Air before Combust.
0.07594 - H2O_tot - H2O Vapor Fract. in Cyl. Gas after Combustion
0.07396 - H2O_stoi - H2O Vapor Fraction in Stoichiometric Burnt Gas

----- ECOLOGICAL PARAMETERS -----

1.1625 - Hartridge - Hartridge Smoke Level
0.12732 - Bosch - Bosch Smoke Number
0.02768 - K,m-1 - Factor of Absolute Light Absorption, 1/m
0.00730 - PM - Specific Particulate Matter emission, g/kWh
482.72 - CO2 - Specific Carbon dioxide emission, g/kWh
0.66444E-04 - NO - Specif. NOx emiss. reduc. to NO, g/kWh (Zeldovich)
* Zeldovich's mechanism usage causes improbable decrease of NOx emission
at large recidual gas fraction and/or at multiple injection. Use DKM !
Contribution of each injected fuel portion in total emission of NOx
p01= 0.207 p02= 0.273 p03= 0.274 p04= 0.207 p05= 0.039
0.01217 - SE - Summary emission of PM and NOx (Complex #1)
0.0000 - SO2 - Specific SO2 emission, g/kWh

----- CYLINDER PARAMETERS -----

10.634 - p_ivc - Pressure at Compression Start (at IVC), bar

361.42	- T_ivc	- Temperature at Compression Start (at IVC), K
0.78305E-03	- m_ivc	- Mass of Gas (incl. Resid.) in Cyl. at IVC, kg
0.16429	- C_ivc	- Stoich. Burnt Gas Fract. in Cyl. at IVC
0.65440E-03	- m_a_ivc	- Mass of Air in Cylinder at IVC, kg
40.588	- p_340	- Pressure in Cylinder at 20 CA deg. BTDC, bar
117.81	- p_tdc	- Compression Pressure at TDC, bar
702.15	- T_tdc	- Compression Temperature at TDC, K
5.4318	- p_evo	- Pressure in Cylinder at EVO, bar
738.27	- T_evo	- Temperature in Cylinder at EVO, K
----- HEAT EXCHANGE IN THE CYLINDER -----		
995.74	- T_eq	- Average Equivalent Temperature of Cycle, K
412.38	- hc_c	- Aver. Factor of Heat Transfer in Cyl., W/m ² /K
700.00	- Tw_pist	- (427 C) Average Piston Crown Temperature, K
490.00	- Tw_lin.up	- (217 C) Upper Part Temp. of Cylind. Liner (near TDC), K
415.40	- Tw_lin.av	- (142 C) Average Cylinder Liner Temperature, K
400.00	- Tw_lin.dn	- (127 C) Lower End Temp. of Cylinder Liner (near BDC), K
470.00	- Tw_head	- (197 C) Average Head Wall Temperature, K
407.11	- Tw_cool	- (134 C) Average Temperature of Cooled Surface
	head	of Cylinder Head, K
398.16	- Tboil	- (125 C) Boiling Temp. in Liquid Cooling System, K
12519.	- hc_cool	- Average Factor of Heat Transfer, W/(m ² *K)
		from head cooled surface to coolant
1089.8	- q_head	- Heat Flow in a Cylinder Head, J/s
613.02	- q_pist	- Heat Flow in a Piston Crown, J/s
40.098	- q_liner	- Heat Flow in a Cylinder Liner, J/s
----- MAIN ENGINE CONSTRUCTION PARAMETERS -----		
30.933	- CR	- Compression Ratio
5.7019	- CR_opn.h	- CR in view of losses due to open height of porting
		 Inj. System A
44	- n_noz.A	- Number of Injector Nozzles
0.85000E-01	- d_noz.A	- Injector Nozzles Bore, mm
0.0000	- Phi_in.A	- Injection Duration for specif. Inj. Profile, deg.
0.0000	- m_f_ip.A	- Fuel Mass for Specif. Injection Profile of Sys.A, g
		 Inj. System C
1	- n_noz.C	- Number of Nozzles of Injection System C
0.20000	- d_noz.C	- Bore of all Nozzles of Injection Syst.C, mm
0.0000	- Phi_in.C	- Injection Duration for Sys.C specif. by Profile, deg.
0.0000	- m_f_ip.C	- Fuel Mass for Specif. Injection Profile of Sys.C, g
		 Ports timing
-126.00	- IVO	- Intake Valve Opening, deg. before DC
139.00	- IVC	- Intake Valve Closing, deg. after BDC
71.000	- EVO	- Exhaust Valve Opening, deg. before BDC
116.00	- EVC	- Exhaust Valve Closing, deg. after DC
----- COMPRESSOR PARAMETERS LP stage -----		
15000.	- RPM_C.lp	- Rotor Speed of LPC, rev/min
1.7635	- P_C.lp	- Power of LP Compressor, kW
0.76000	- Eta_C.lp	- Adiabatic Efficiency of LP Compressor
0.01947	- m_C.lp	- Mass Airflow of LP Compressor, kg/sec
0.33296	- m*_C.lp	- Mass Airflow Parameter, kg SQRT(K)/(s bar)
0.01929	- m_cor_Clp	- Corrected Mass Airflow of LPC, kg/s
886.12	- RPM*_C.lp	- Rotor Speed Parameter, rev/min SQRT(K)
15297.	- RPMcor_lp	- Corrected Rotor Speed, rev/min
2.1172	- PR_C.lp	- Pressure Ratio of LP Compressor
0.0000	- Kpi_C.lp	- Factor Kpi of LP Compressor
0.99000	- po_iC.lp	- Inlet Total Pressure of LPC, bar
286.55	- To_iC.lp	- (13 C) Inlet Total Temperature of LPC, K
2.0960	- po_"C.lp	- Total Discharge Press.(before LP cooler), bar
376.66	- To_"C.lp	- (104 C) Total Discharge Temp. (before LP cooler), K
0.96000	- Ecool.lp	- Thermal Efficiency of LP Air Inter-cooler
306.00	- Tcool.lp	- (33 C) LP Inter-cooler Refrigerant Temperature, K
123.46	- A_cool	- Factor of pressure losses in the Inter-cooler
2.0760	- po_C.lp	- Total Pressure after LP Inter-cooler, bar
308.83	- To_C.lp	- (36 C) Total Temperature after LP Inter-cooler, K
0.00434	- H2O_vap	- H2O Vapor Mass Fraction in Air after Intercooler
0.0000	- H2O_liq	- H2O Liquid Mass Fraction in Air after Intercooler
----- COMPRESSOR PARAMETERS HP stage -----		
15000.	- RPM_C.hp	- Rotor Speed of HPC, rev/min
2.6952	- P_C.hp	- Power of HPC, kW

0.93000 - Eta_C.hp - Adiabatic Efficiency of HPC
0.01947 - m_C.hp - Mass Airflow of HP Compressor, kg/s
0.16483 - m*_C.hp - Mass Airflow Parameter, kg SQRT(K)/(s bar)
0.00955 - m_cor_Chp- Corrected Mass Airflow of HPC, kg/s
853.56 - RPM*_C.hp- Rotor Speed Parameter, rev/min SQRT(K)
14735. - RPMcor_hp- Corrected Rotor Speed, rev/min
3.3679 - PR_C.hp - Pressure Ratio of HP Compressor
0.0000 - Kpi_C.hp - Factor Kpi of HP Compressor
2.0760 - po_iC.hp - Inlet Total Pressure of HPC, bar
308.83 - To_iC.hp - (36 C) Inlet Total Temperature of HPC, K
6.9920 - po_C.hp - Total Discharge Press. (before HP cooler), bar
446.55 - To_C.hp - (173 C) Total Discharge Temp. (before HP cooler), K
0.97000 - Ecool.hp - Thermal Efficiency of HP Air Inter-cooler
310.00 - Tcool.hp - (37 C) HP Inter-cooler Refrigerant Temperature, K
407.67 - A_cool - Factor of pressure losses in the Inter-cooler
6.9720 - po_C.hp - Total Pressure after Inter-cooler, bar
314.10 - To_C.hp - (41 C) Total Temperature after Inter-cooler, K
0.00434 - H2O_vap - H2O Vapor Mass Fraction in Air after Intercooler
0.0000 - H2O_liq - H2O Liquid Mass Fraction in Air after Intercooler

----- TURBINE PARAMETERS HP stage -----
15000. - RPM_T.hp - HP Turbine Rotor Speed, rev/min
0.0000 - P_T.hp - Effective Power of HPT, kW
1.00000 - Eta_T.hp - Internal turbine Efficiency of HPT
0.97000 - Eta_mT.hp- Mechanical Efficiency of HPT
0.02062 - m_T.hp - Mass Gasflow of HPT, kg/s
0.00249 - m*_T.hp - Mass Gasflow Parameter, (kg SQRT(K))/(s kPa)
573.92 - RPM*_T.hp- Rotor Speed Parameter, rev/min SQRT(K)
1.00000 - PR_T.hp - Expansion Pressure Ratio of HPT
0.0000 - B_T.hp - Relative Work B=118.34 {1-PR*[(1-k)/k]} Eta_T
2.1639 - po_T.hp - Inlet Total Pressure of HPT, bar
683.08 - To_T.hp - (410 C) Inlet Total Temperature of HPT, K
2.1639 - po_eT.hp - HP Turbine Exhaust Back Pressure, bar
683.08 - To_eT.hp - (410 C) HP Turbine Exhaust Back Temperature, K

----- TURBINE PARAMETERS LP stage -----
15000. - RPM_T.lp - LP Turbine Rotor Speed, rev/min
1.7831 - P_T.lp - Effective Power of LPT, kW
0.67824 - Eta_T.lp - Adiabatic Efficiency of LPT
0.97000 - Eta_mT.lp- Mechanical Efficiency of LPT
0.02062 - m_T.lp - Mass Gasflow of LPT, kg/s
0.00249 - m*_T.lp - Mass Gasflow Parameter, (kg SQRT(K))/(s kPa)
573.92 - RPM*_T.lp- Rotor Speed Parameter, rev/min SQRT(K)
2.1238 - PR_T.lp - Expansion Pressure Ratio of LPT
13.682 - B_T.lp - Relative Work B=118.34 {1-PR*[(1-k)/k]} Eta_T
2.1639 - po_T.lp - Inlet Total Pressure of LPT, bar
683.08 - To_T.lp - (410 C) Inlet Total Temperature of LPT, K
1.0189 - po_eT.lp - LP Turbine Exhaust Back Pressure, bar
601.76 - To_eT.lp - (329 C) LP Turbine Exhaust Back Temperature, K

----- MULTIPLE INJECTION PARAMETERS -----

	Injection						Ignition		Large Drops	
	SOI	Fract.	Mass	Separ.	Durat.	d32	Delay	Burst	d32	Evapor
	[CA BTDC]		[g]	[CA]	[CA]	[micr]	[CA]	[CA]	[micr]	[CA]
Pilot 1	80.0	.200	.0044	--	2.2	16.0	86.6	364.6	41	11
Pilot 2	76.4	.300	.0066	1.4	2.8	14.5	80.4	363.1	39	13
Pilot 3	72.2	.300	.0066	1.4	2.8	14.4	76.3	363.1	38	14
Pilot 4	68.0	.200	.0044	1.4	2.2	15.5	74.6	364.6	39	15
Main **	20.0	1.00	.0010	45.8	3.0	22.0	24.2	363.1	54	42

===== THE ALLOCATION OF FUEL IN THE ZONES AT THE END OF INJECTION =====

N\In plan	Spray	Impingment	Fractions of fuel in the zones %					
s\ Angle	Angle	Surface	Dilut.	S.Core	Piston	Inters.	Head	Liner
1\ 0.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
2\ 8.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
3\ 16.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
4\ 24.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
5\ 32.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00

6	40.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
7	48.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
8	56.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
9	64.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
10	72.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
11	80.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
12	88.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
13	96.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
14	104.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
15	112.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
16	120.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
17	128.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
18	136.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
19	144.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
20	152.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
21	160.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
22	168.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
23	176.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
24	-176.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
25	-168.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
26	-160.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
27	-152.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
28	-144.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
29	-136.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
30	-128.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
31	-120.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
32	-112.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
33	-104.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
34	-96.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
35	-88.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
36	-80.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
37	-72.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
38	-64.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
39	-56.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
40	-48.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
41	-40.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
42	-32.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
43	-24.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00
44	-16.0	38.0	not imping	0.87	1.07	0.00	0.00	0.00	0.00

Sum for system : "A" %	85.	38.13	47.14	0.00	0.00	0.00	0.00
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45	129.0	84.0	not imping	71.60	18.26	0.00	0.00	0.00	0.00
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Sum for system : "C" %	90.	71.60	18.26	0.00	0.00	0.00	0.00
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Evaporation constants	bi	511	906	299	252	51	12
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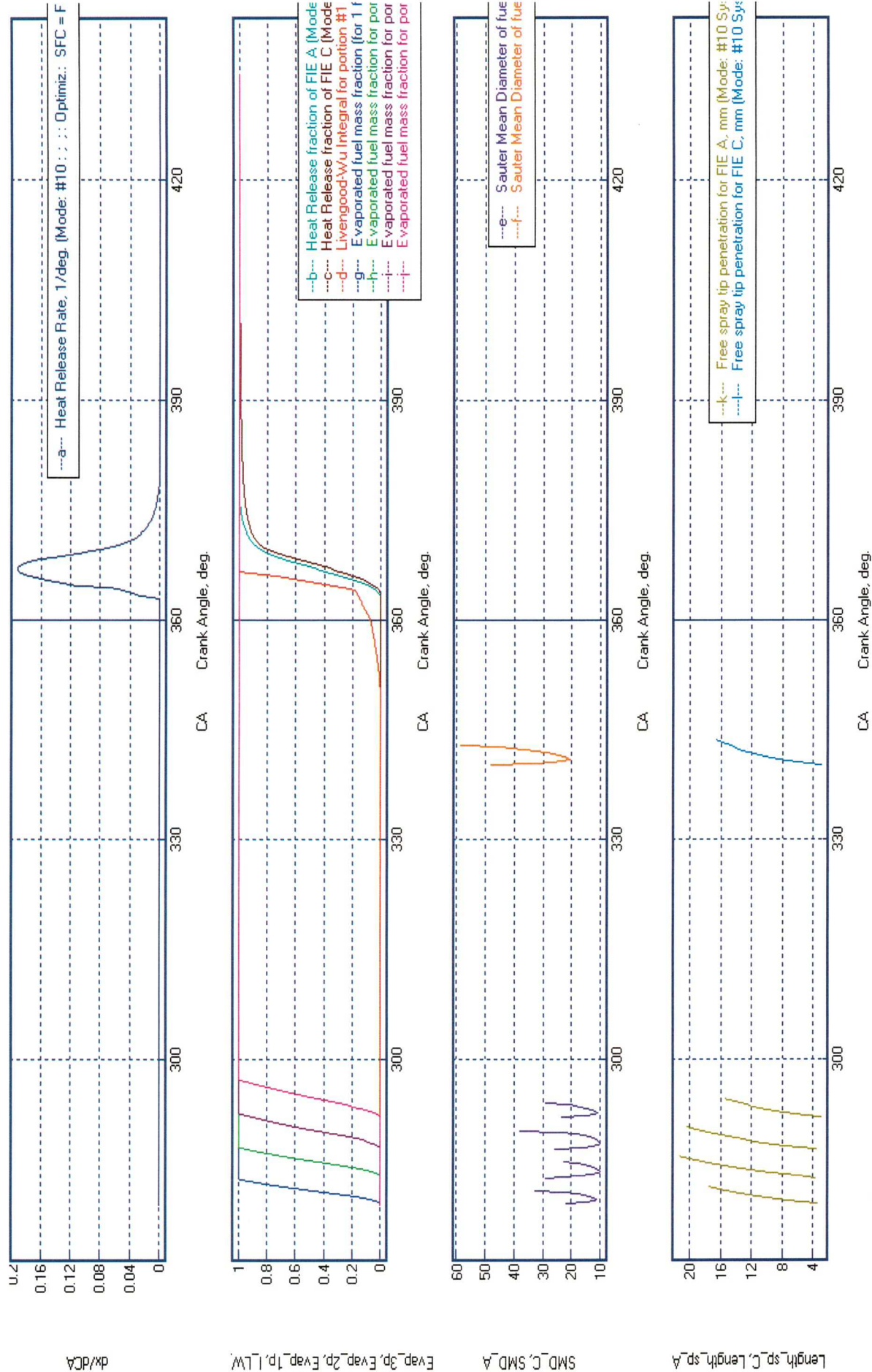
The note: "Inters." is column with fraction of fuel in a zone of intersection of Near-Wall Flows formed by adjacents sprays.

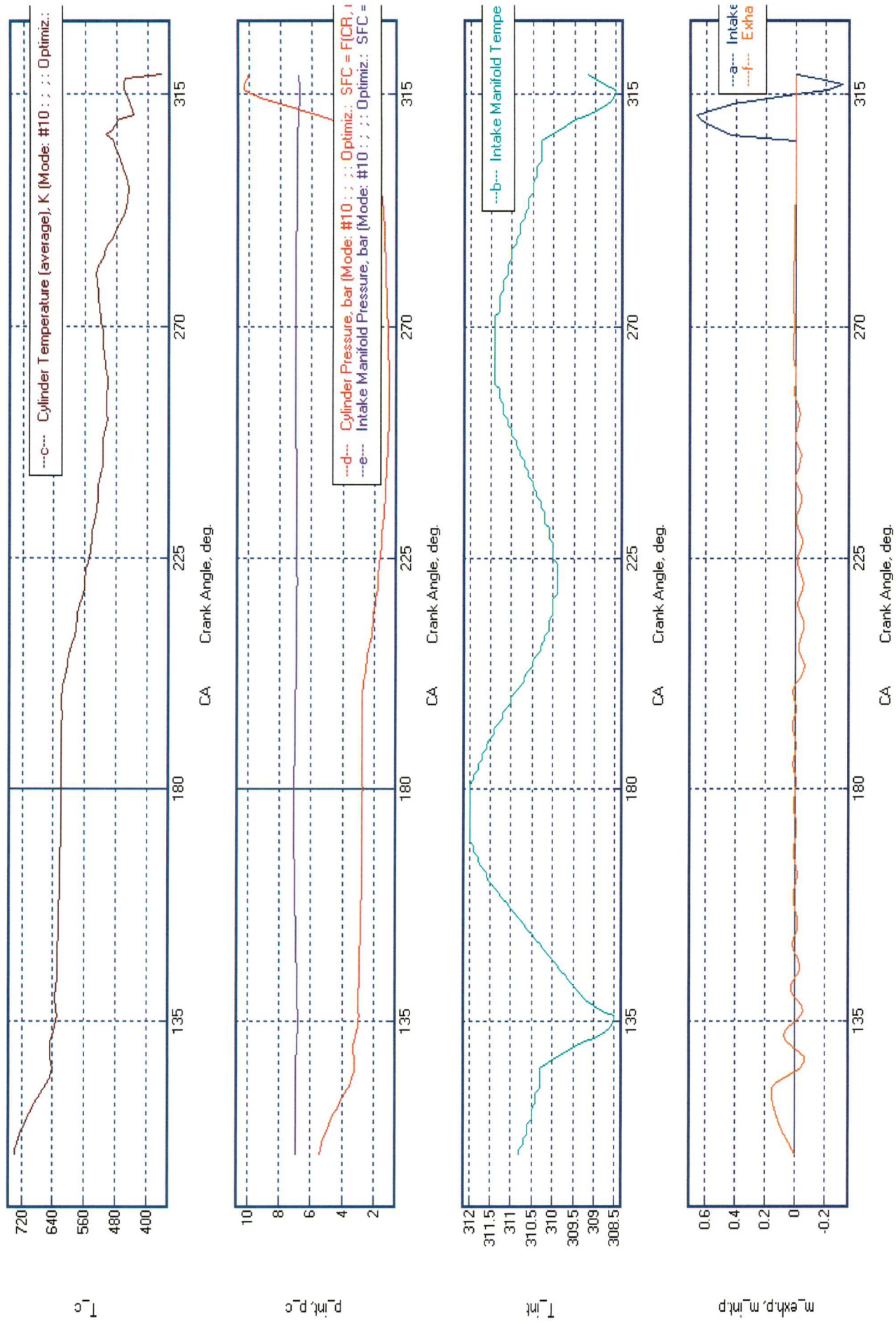
Rs:Swirl| (Piston clearance,mm 1.00) |Optimal|-Geometric formula: 0.58

Ratio| Rs of piston bowl 2.11 | Rs |-by Razleytsev : 0.58

Vers: 5.2.0.33 (Kernel 17.12.19; RK-model 21.12.19; NOx-model 06.12.19)

Diesel - RK: Fuel Injection and Heat Release





Diesel - RK: &In-cylinder Parameters

