DPF FEASIBLITY STUDY REPORT

TEHRAN-IRAN

DPFs' Monthly Operation Report

Report Period: 01/Aug/2015 – 31/Aug/2015

Documents Numbers: DPF2015081/1, DPF215082/1

Contents:
Results Overview
Detailed Reports

Installed DPFs:

Vehicle ID	DPF Producer Company
78514 (line 4)	HJS_01 (Passive system with FBC)
85423 (line 4)	HJS _02 (Active system with FBC - Electrical Heater)
78515 (line 4)	Dinex_01 (Passive system with FBC)
78524 (line 4)	PURItech (Passive system with FBC)
33572 (line 2)	HJS_03 (Active system with FBC - Electrical Heater)
33637 (line 2)	Dinex_02(Passive system with FBC)
85476 (line 10)	HJS_04 (Passive system with FBC)

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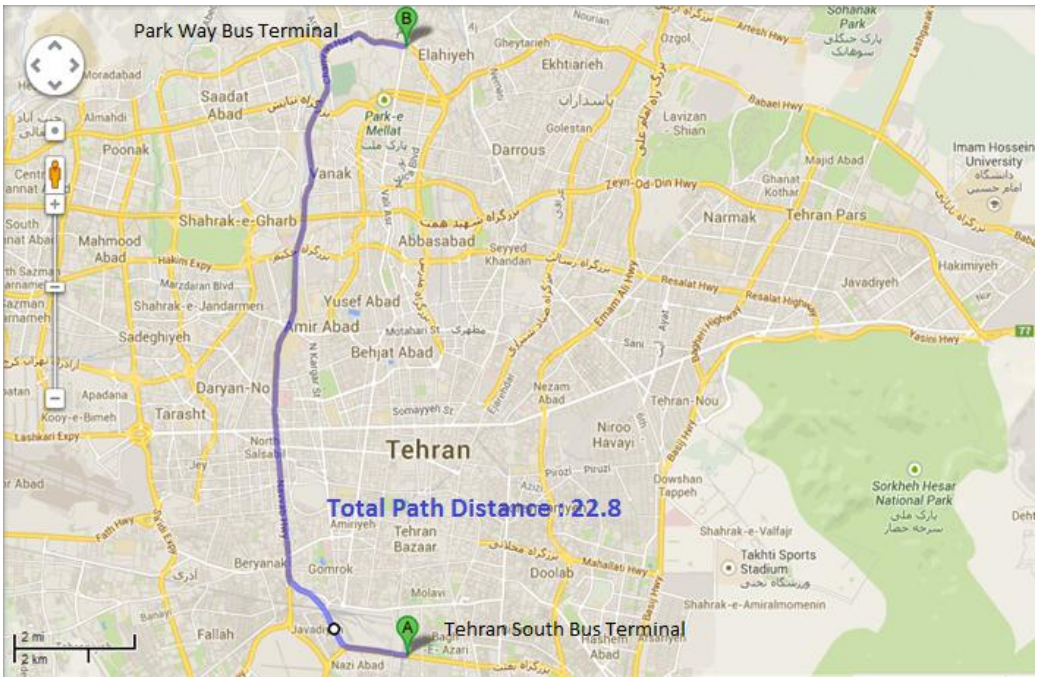
DPFs' Operation Results Overview

Vehicle ID	DPF Producer Company	Operation Status	Operation Status
		Aug/01/2015 - Aug/15/2015	Aug/16/2015 - Aug/31/2015
78514 (line 4)	HJS_01 (Passive system with FBC)	**1**	**2**
85423 (line 4)	HJS _02 (Active system with FBC - Electrical Heater)	**1**	**1**
78515 (line 4)	Dinex_01 (Passive system with FBC)	**2**	**2**
78524 (line 4)	PURItech (Passive system with FBC)	**1**	**2**
33572 (line 2)	HJS_03 (Active system with FBC - Electrical Heater)	**2**	**2**
33637 (line 2)	Dinex_02 (Passive system with FBC)	**5**	**3**
85476 (line 10)	HJS_04 (Passive system with FBC)	**1**	**2**

Status Number	Operation Status	Description
1	Excellent	Pressure above 200 mbar<0.1% ($P200 \sim 0$)
2	Good	$0.1\% \leq P200 \leq 3\%$
3	Maintenance required	$P200 > 3\%$ or DPF system blocking
4	Failed	DPF defect, black smoke, holes in the filter element
5	NO DPF	DPF was removed for cleaning or other issues

Vehicle plate number	78514
Bus line	Number 4 (south to north bus line)
DPF producer company	HJS_01 (Passive system with FBC)



Overall Information

Table1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, Sim +989218355923
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	1/Aug/2015 – 15/Aug/2015 (fifteen days)*
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.04 [1/m]

Notice: Due to data logger problem, system's data missed from Aug 10th to 19th. So this report data belong to Aug 1st to 10th except table 3.

Table 2- DPF Maintenance History

Filter maintenance date	DPF core was cleaned on Jun 13th.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	- km
Bus mileage over the period	- km
Working days over the period	15 days
Stop days	0 day
Data logger working days	10 days
Working hours over the period	217 hours 20 minutes*
Average working hours per day (including stop days)	14 hours 30 minutes
Bus average speed	- km/hr
idle speed time to all working time ration	47.34 %
Total Bus fuel consumption over the period	- lit
Fuel consumption per hour	- lit/hr
Average fuel consumption	- lit/km
Total Bus additive consumption over the period	0.700 lit
Average additive consumption	- cc/km
Additive consumption to fuel ration	- cc/1000lit

Notice: Working hours were calculated from GPS data.
Notice: According to bus company information, fuel consumption and working mileage data are unavailable during this period.

Temperature, Pressure and Engine Speed Overview

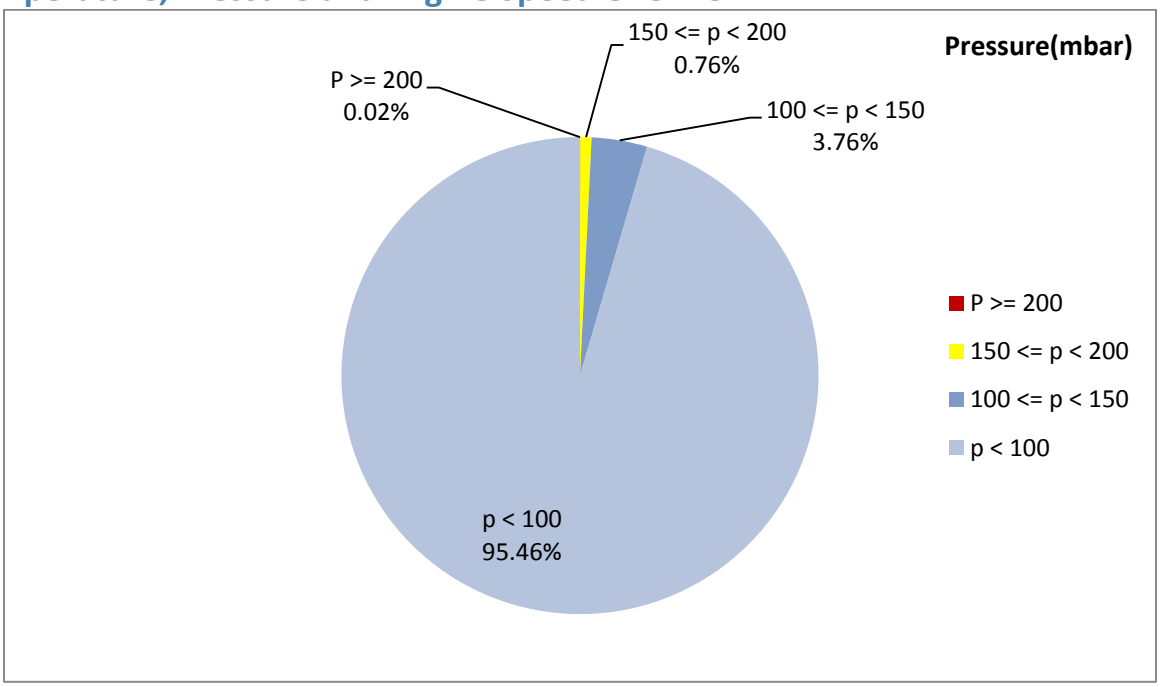


Figure 1- Pressure distribution over the working hours

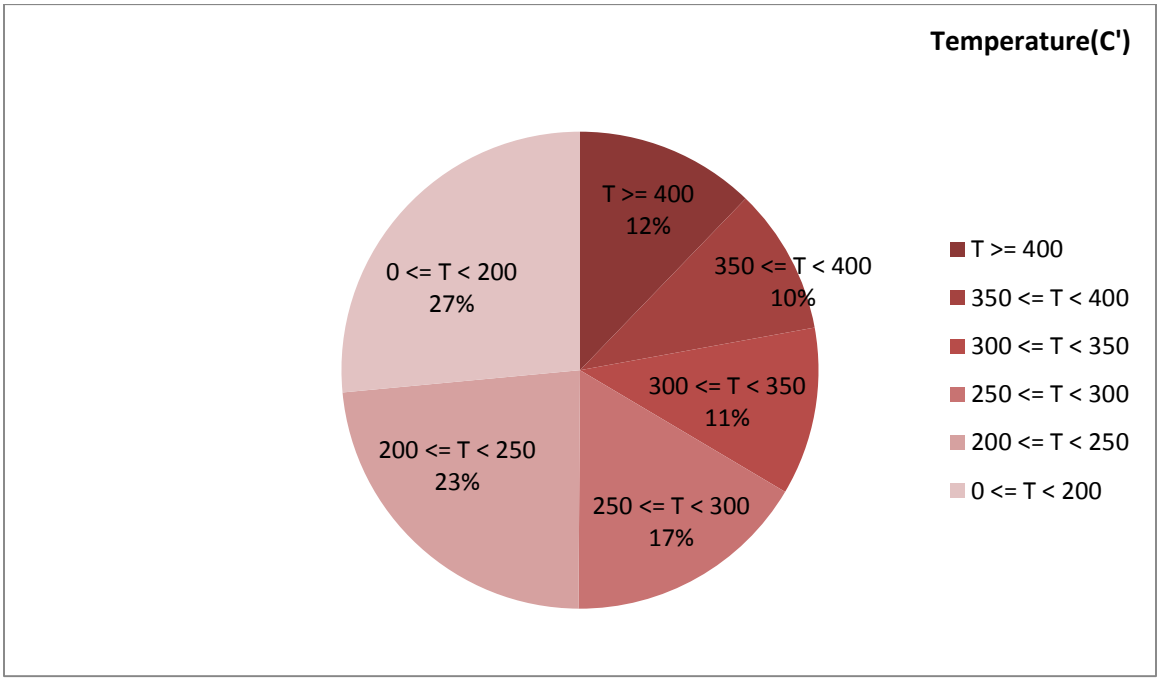


Figure 2-Temperature distribution over the working hours

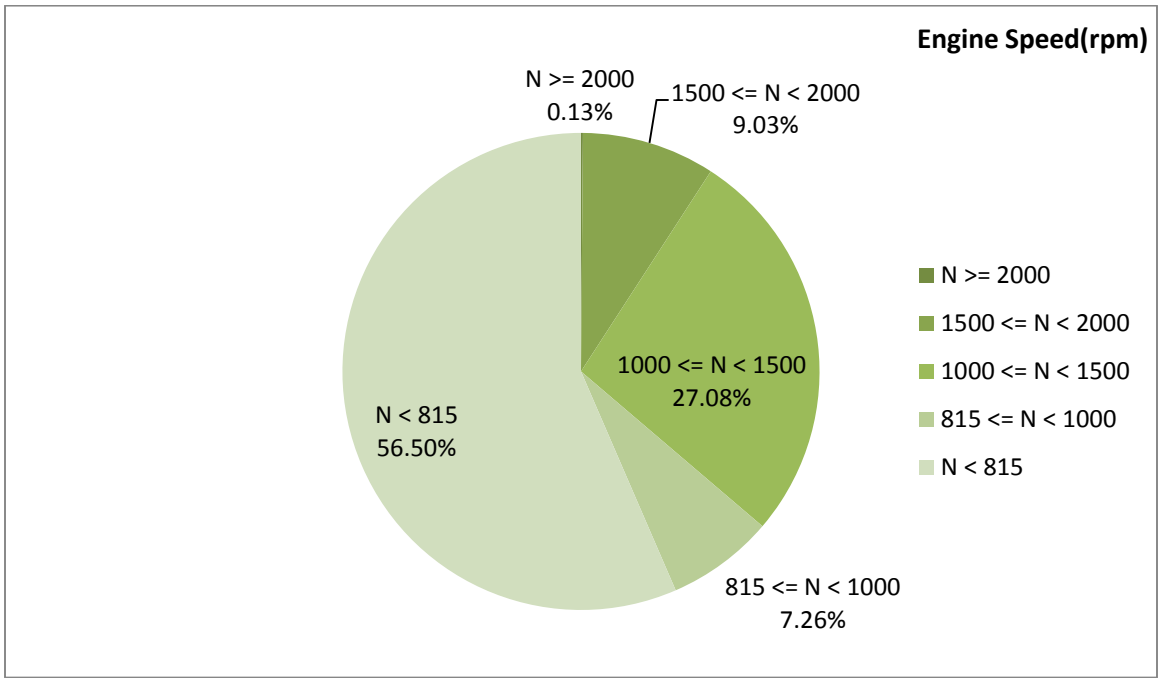


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
268.35	24.21	919

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
314.33	40	1169

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
554-50	207-0	2160-256

Detailed Pressure Analysis

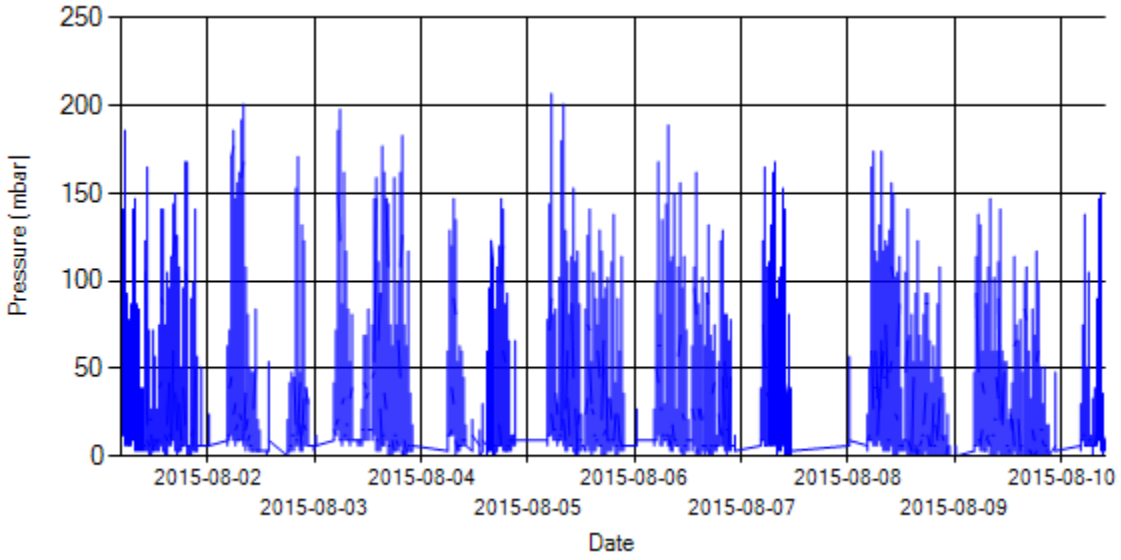


Figure 4- Pressure distribution over the period

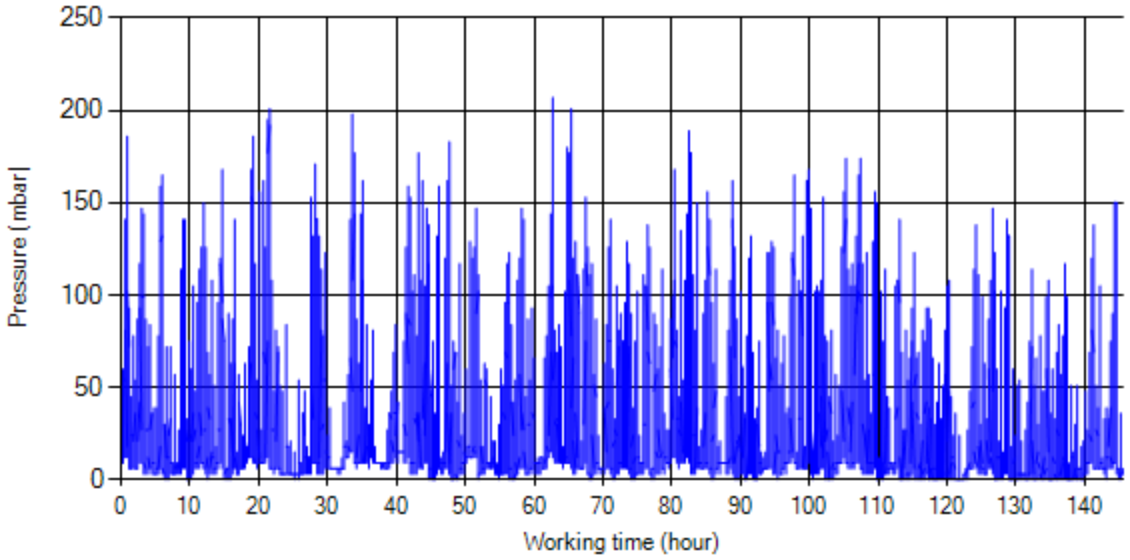


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

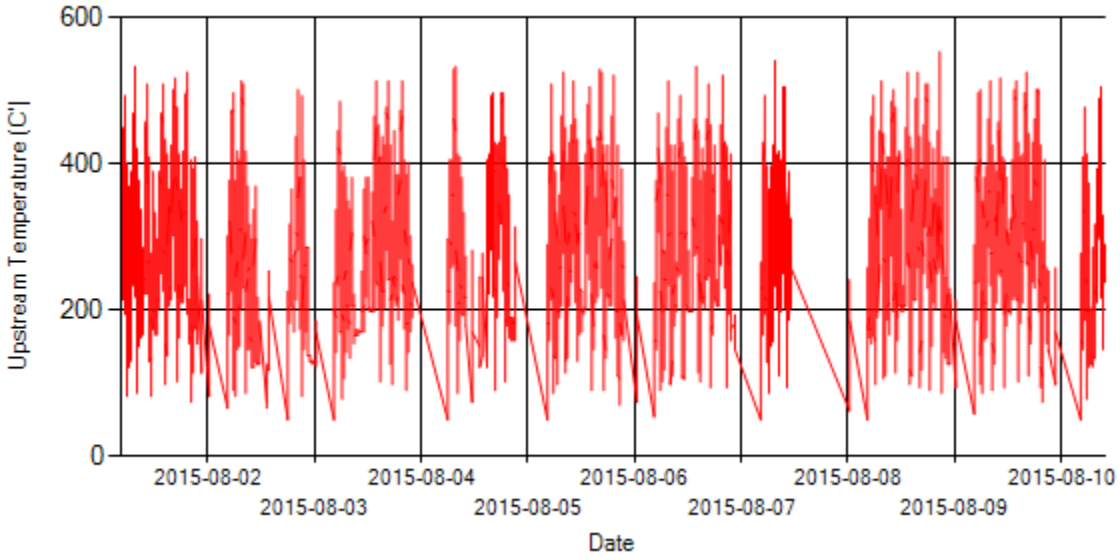


Figure 6- Temperature distribution over the period

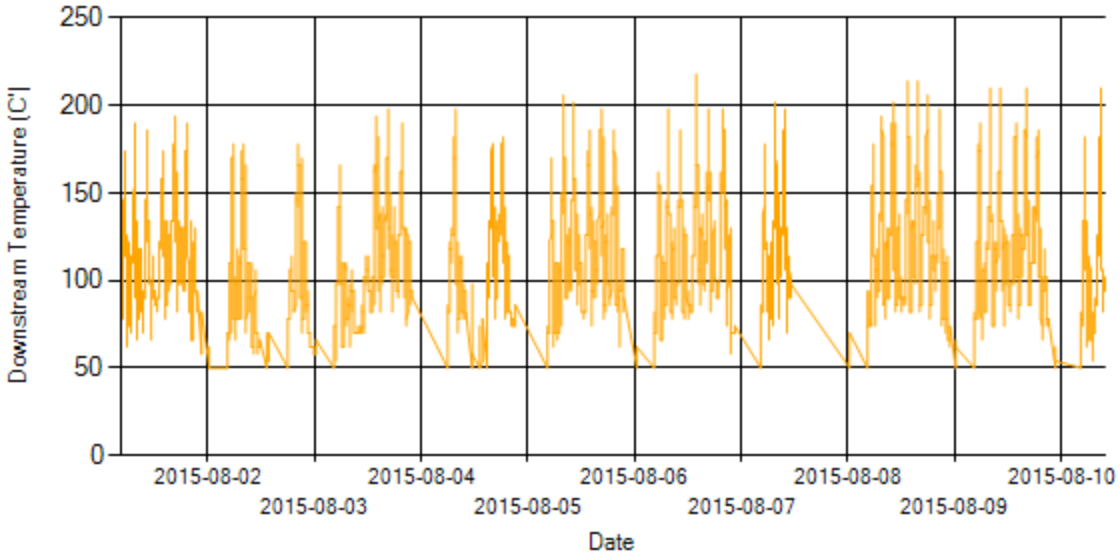


Figure 7- Temperature distribution over the period

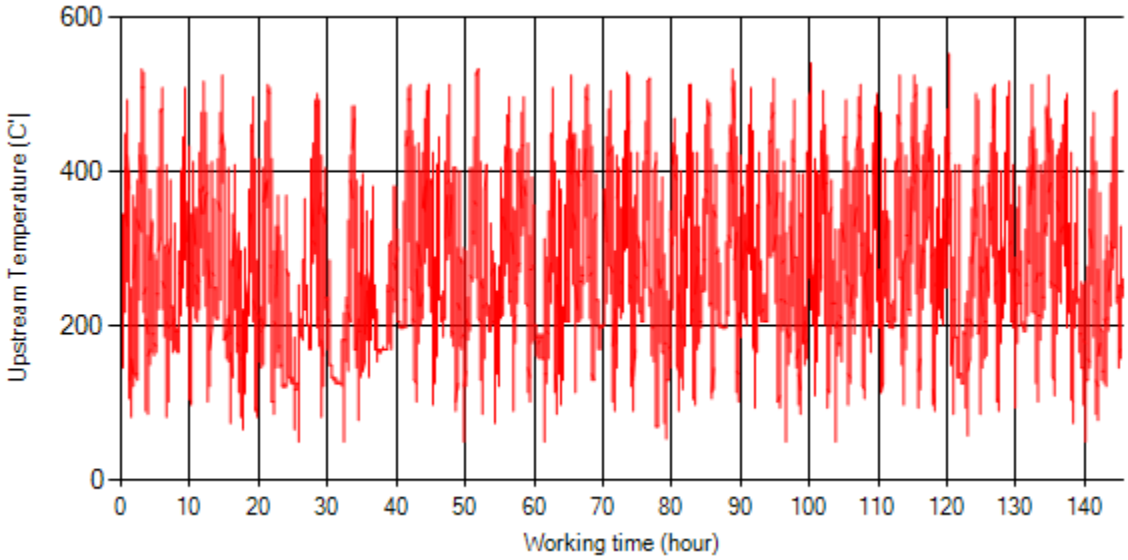


Figure 8- Temperature vs. working hours

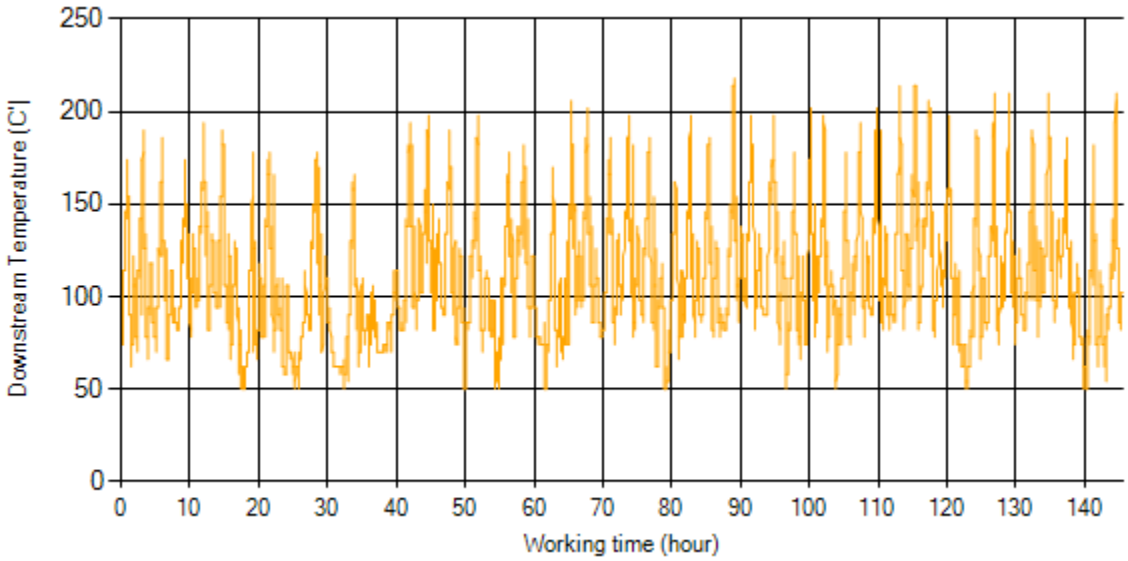


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

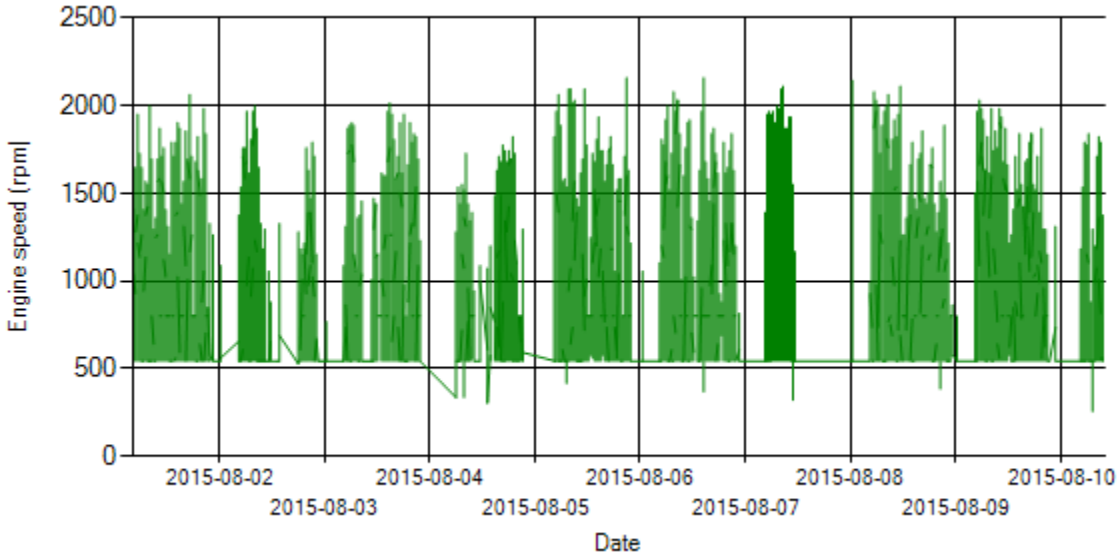


Figure 10- Engine speed distribution over the period

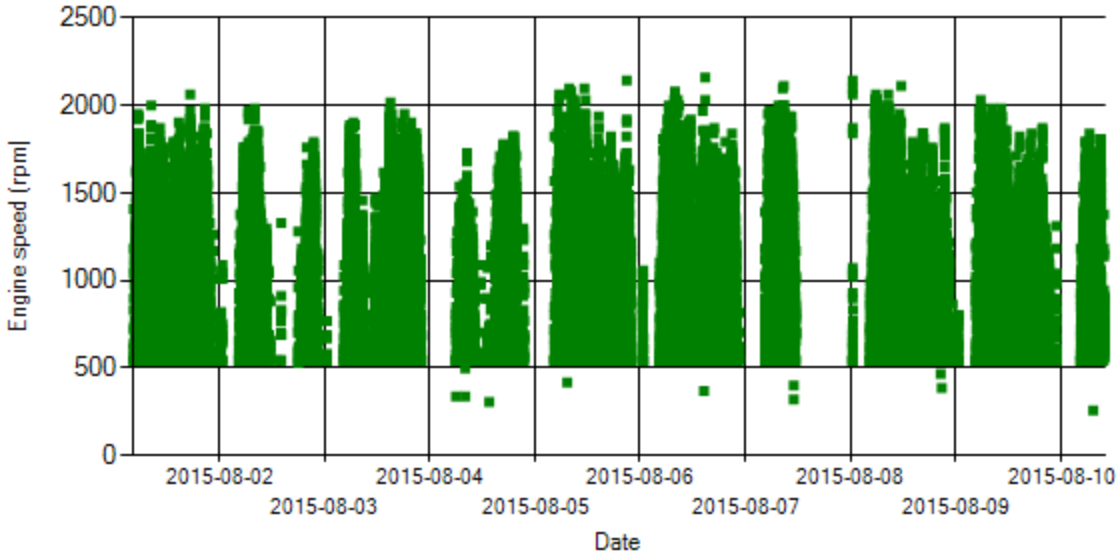


Figure 11- Engine speed diagram for calculating CPK's working days

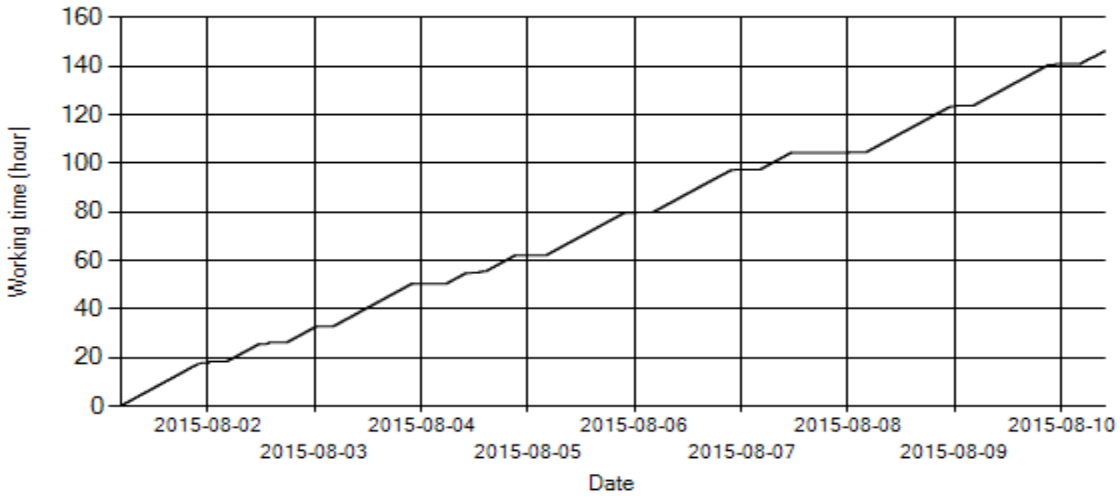


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, stop days can't be observed during this period.

Pressure-Engine Speed diagrams

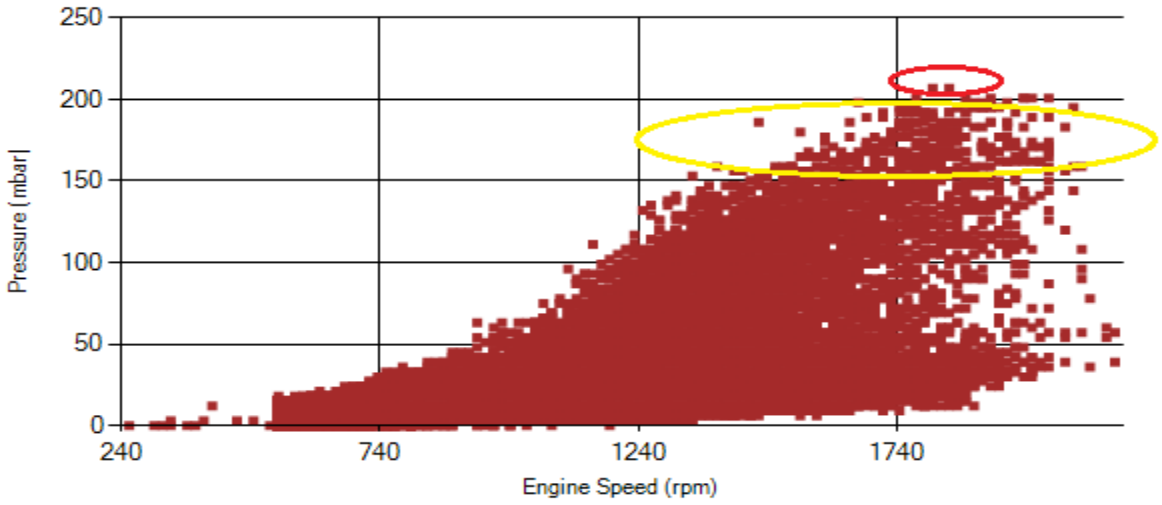


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

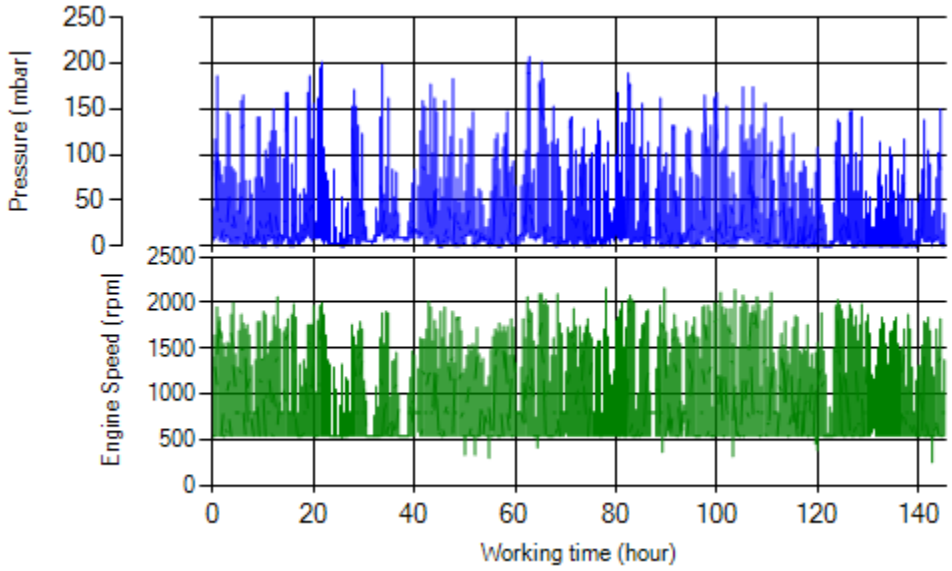


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

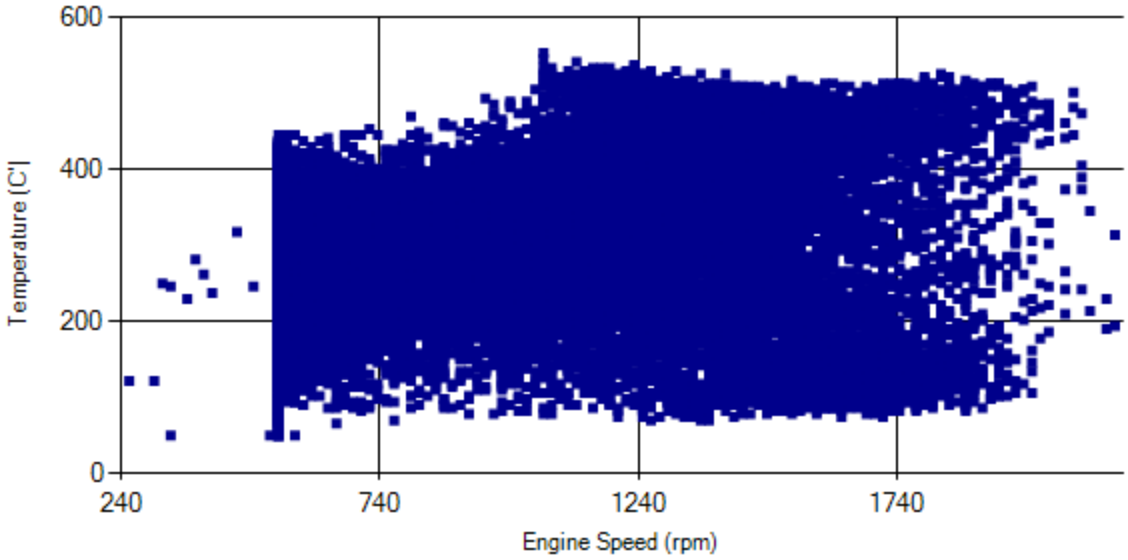


Figure 15- Temperature against engine speed

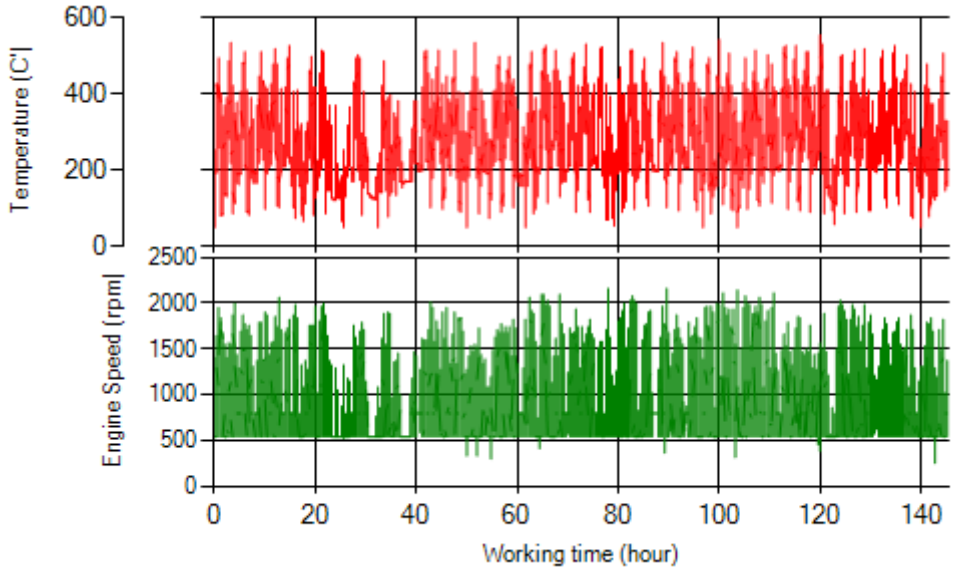


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.02% of total working time pressure is above 200 mbar and 0.78% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 12% of total working time temperature is above 400 ℃ and 22% above 350℃. This high temperature distribution is one of the important factors for filter excellent operation during the period.

Filter operation status	Excellent ■ Good ☐ Maintenance required ☐ Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, Sim +989218355923
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	16/Aug/2015 – 31/Aug/2015 (sixteen days)*
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.04 [1/m]

Notice: Due to data logger problem, system data from Aug 10th until 19th missed. So this report data belong to Aug 20th to 31st except table 3.

Table 2- DPF Maintenance History

Filter maintenance date	DPF core was cleaned on Jun 13th.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	53392 km
Bus mileage over the period	1735 km
Working days over the period	14 days
Stop days	2 days
Data logger working days	10 days
Working hours over the period	141 hours 50 minutes*
Average working hours per day (including stop days)	8 hours 52 minutes
Bus average speed	12.23 km/hr
idle speed time to all working time ration	56.75 %
Total Bus fuel consumption over the period	1083 lit
Fuel consumption per hour	7.63 lit/hr
Average fuel consumption	62 lit/km
Total Bus additive consumption over the period	0.455 lit
Average additive consumption	264 cc/km
Additive consumption to fuel ration	420 cc/1000lit

Notice: Working hours were calculated from GPS data.

Temperature, Pressure and Engine Speed Overview

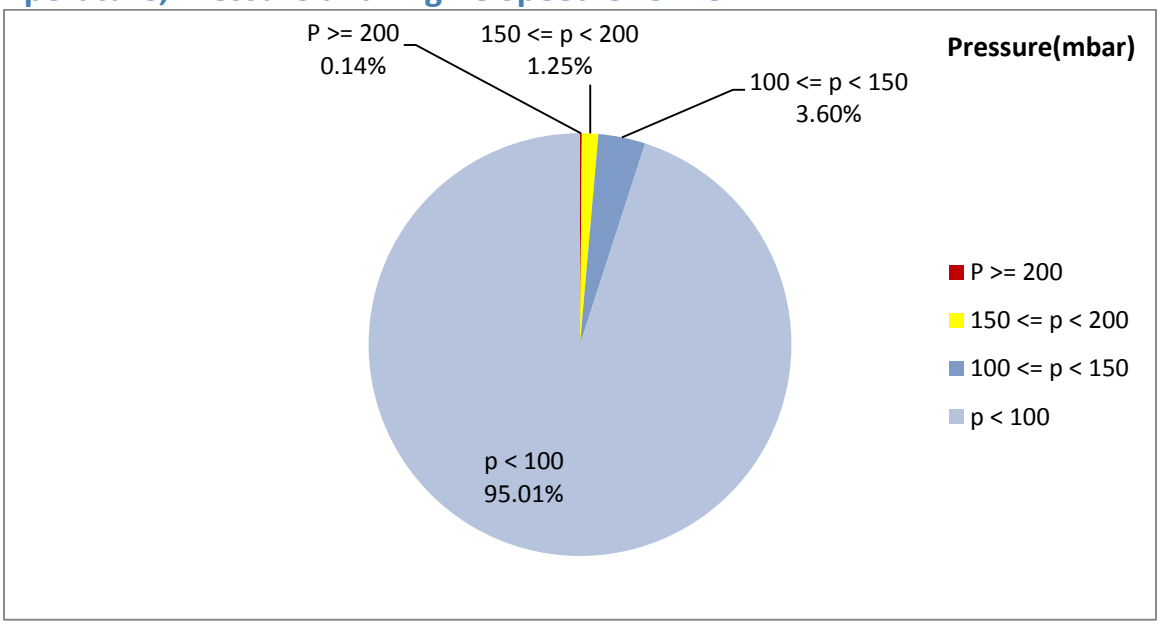


Figure 1- Pressure distribution over the working hours

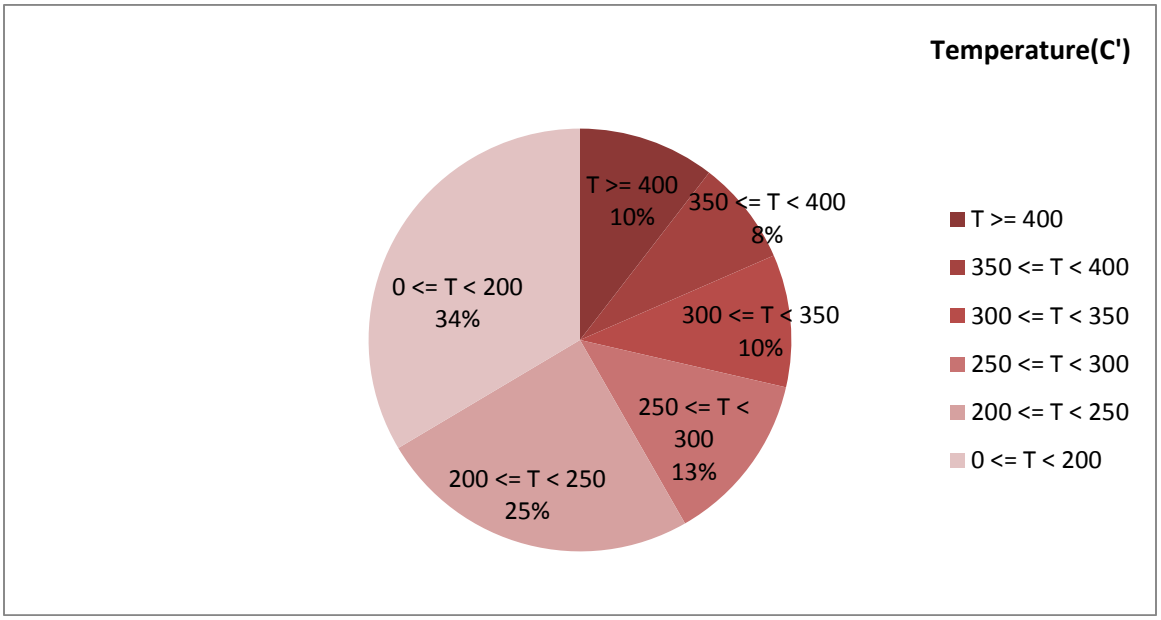


Figure 2-Temperature distribution over the working hours

Notice: Temperature sensors got problem on Aug 20th and was fixed on Aug 25th. So figure 2 data belong to temperature sensors working days (Aug 26th to Aug 31st).

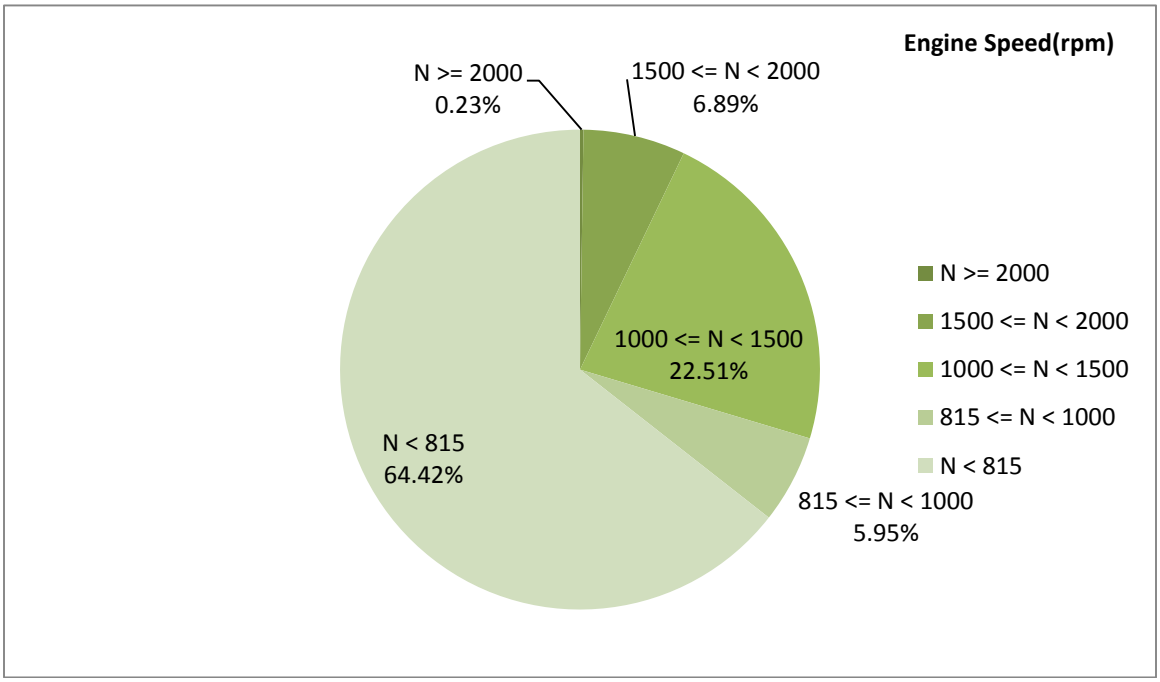


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
253.63	25.51	879

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
311.21	46.88	1164

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	237-0	2160-256

Notice: Temperature sensors got problem on Aug 20th and was fixed on Aug 25th. So Tables' temperature data belong to temperature sensors working days (Aug 26th to Aug 31st).

Detailed Pressure Analysis

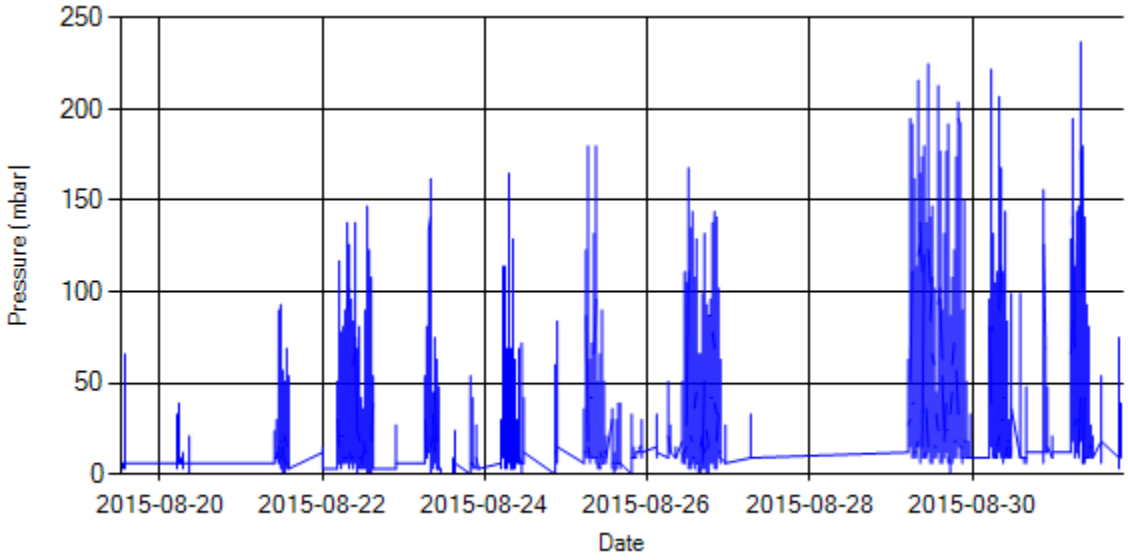


Figure 4- Pressure distribution over the period

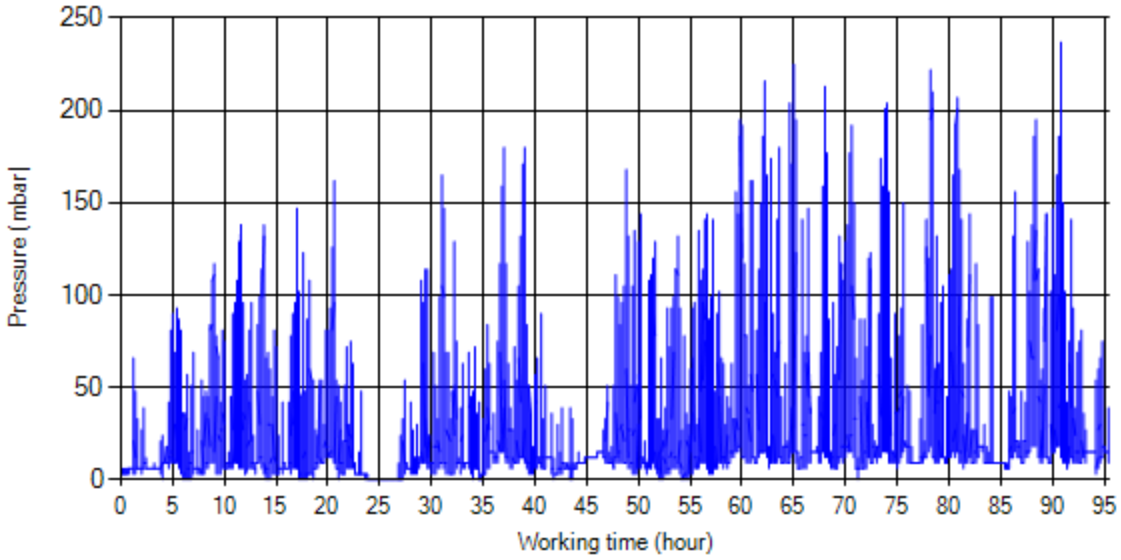


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

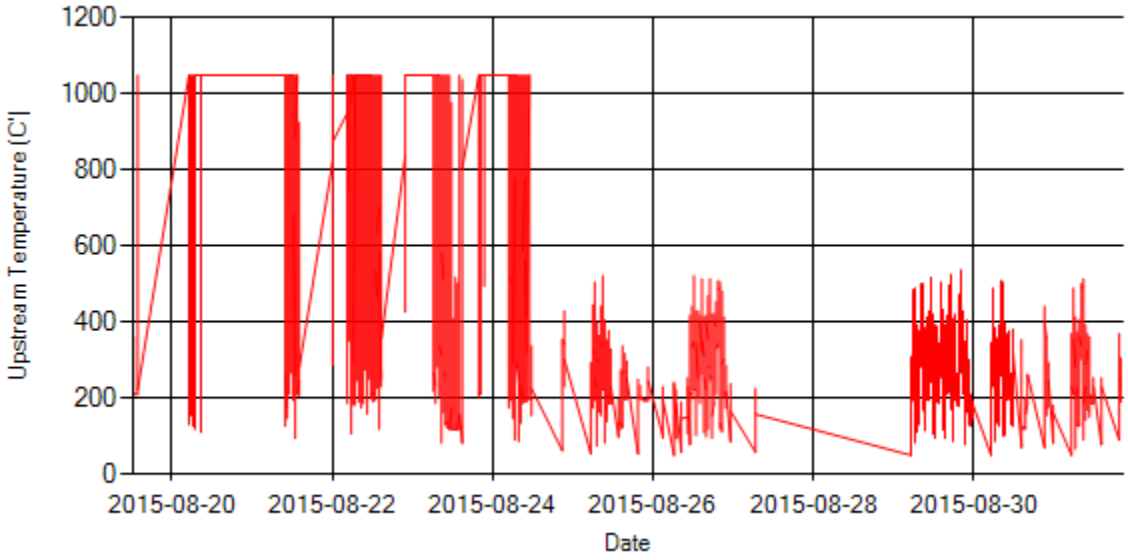


Figure 6- Temperature distribution over the period

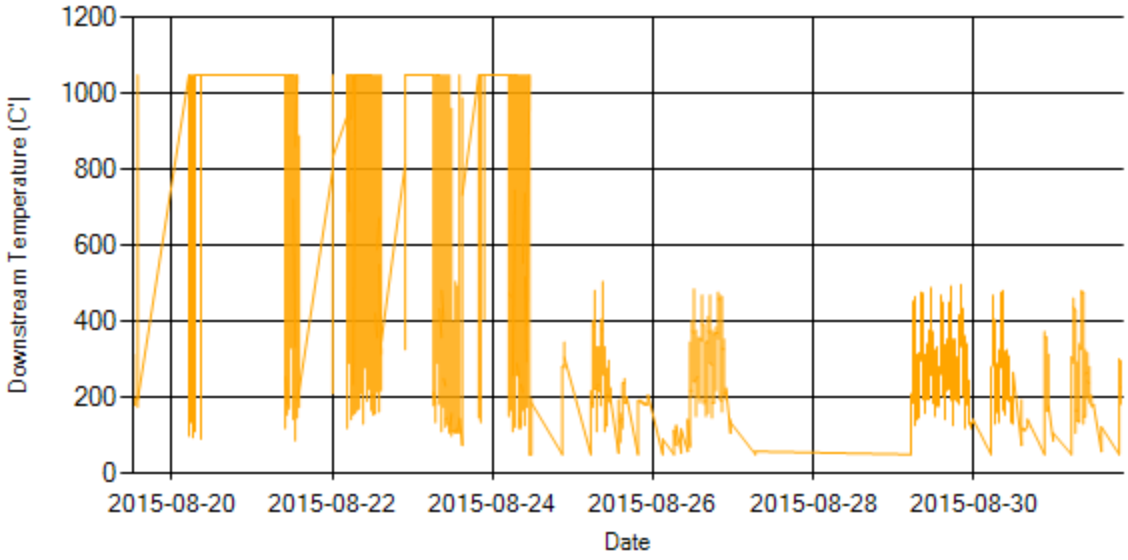


Figure 7- Temperature distribution over the period

Notice: Temperature sensors got problem on Aug 20th and was fixed on Aug 25th (sensors' connections looseness)

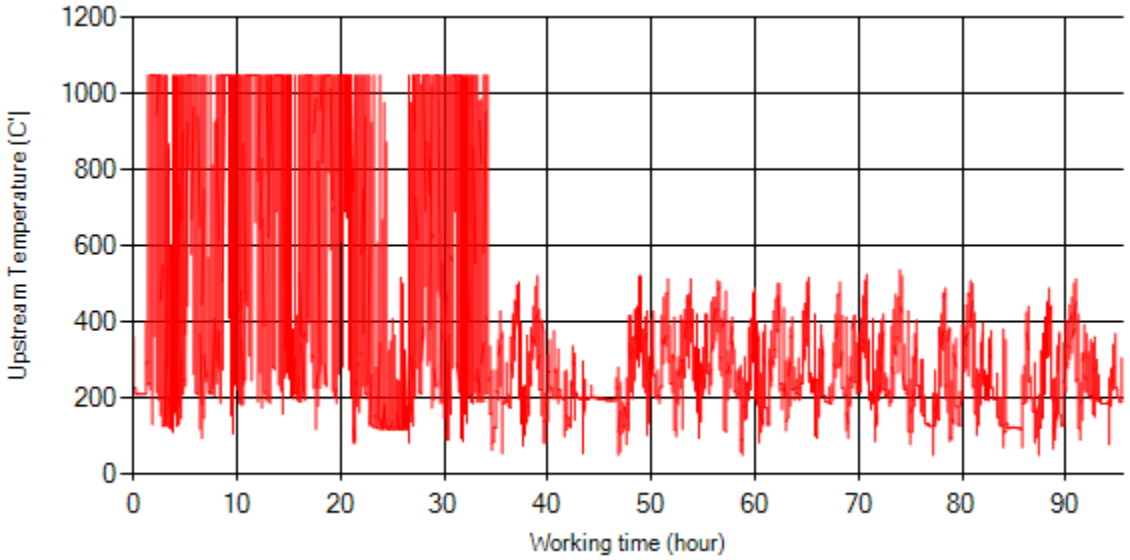


Figure 8- Temperature vs. working hours

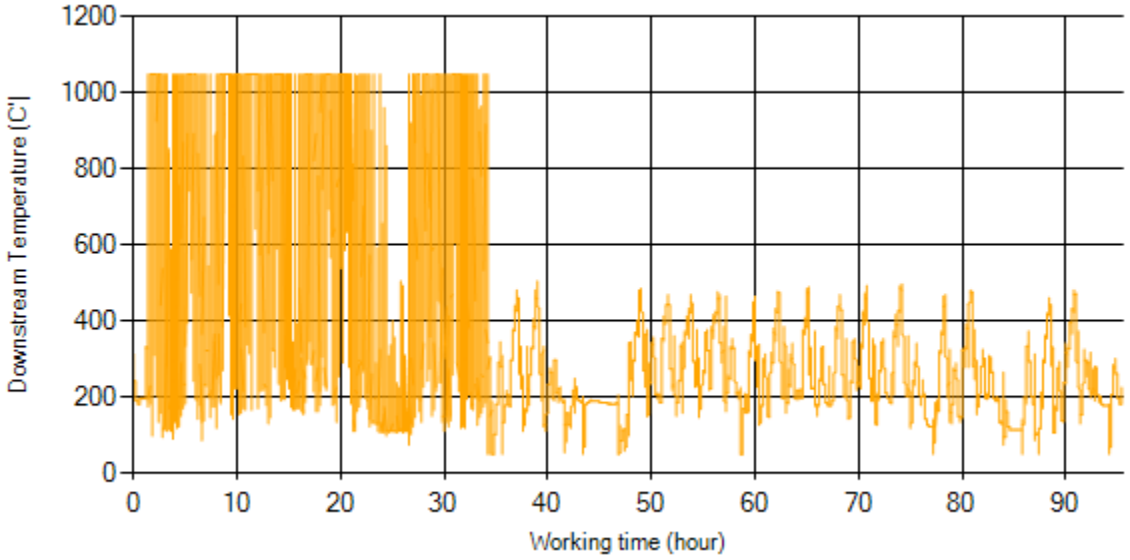


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

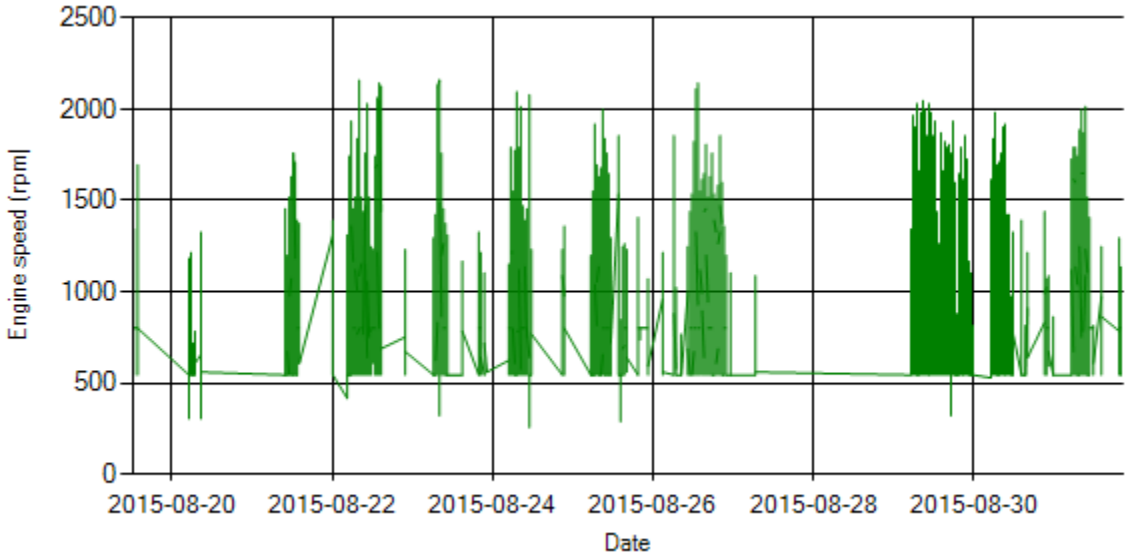


Figure 10- Engine speed distribution over the period

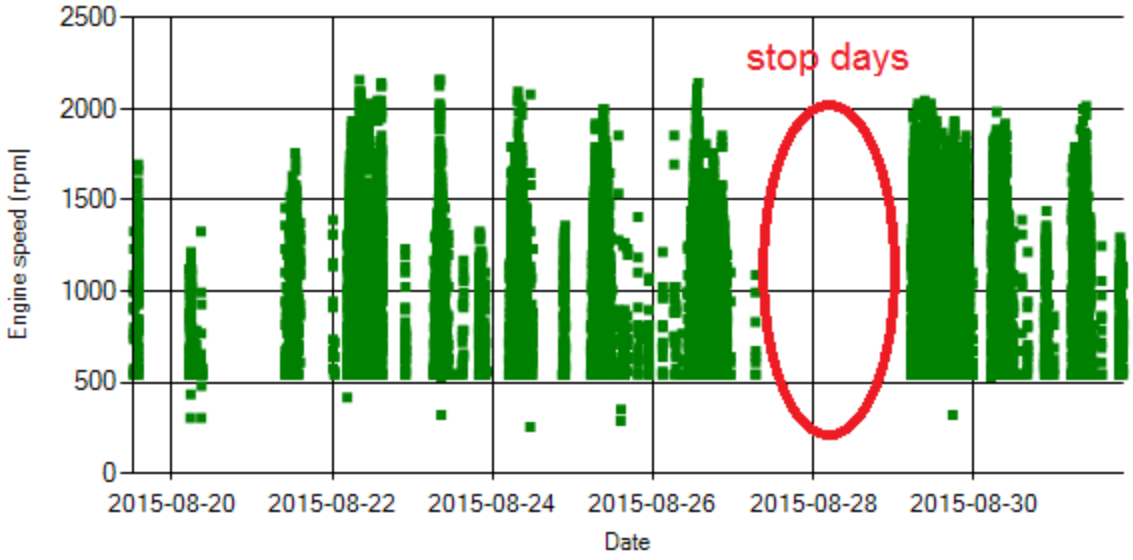


Figure 11- Engine speed diagram for calculating CPK's working days

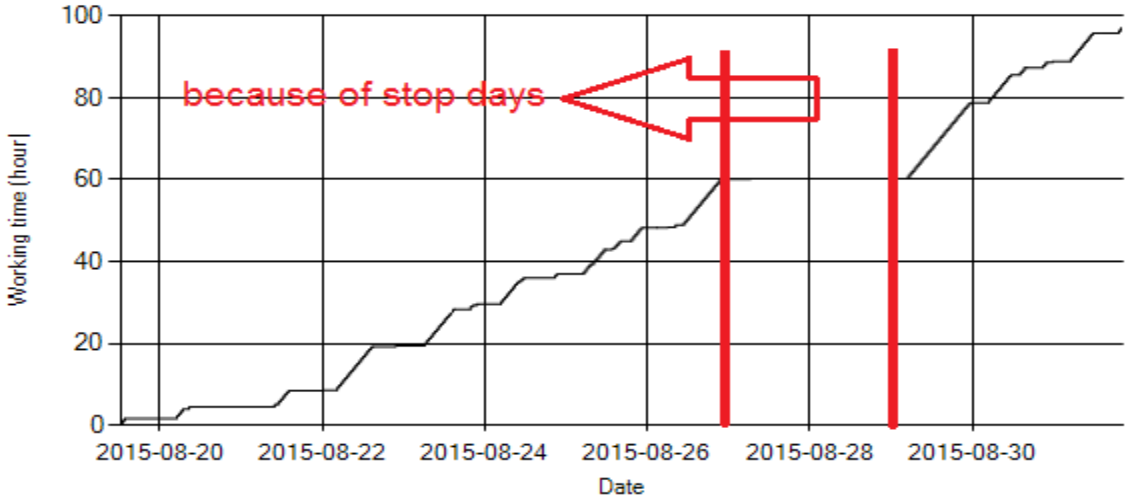


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger didn't sample on Aug 27th and 28th because of stop days.

Pressure-Engine Speed diagrams

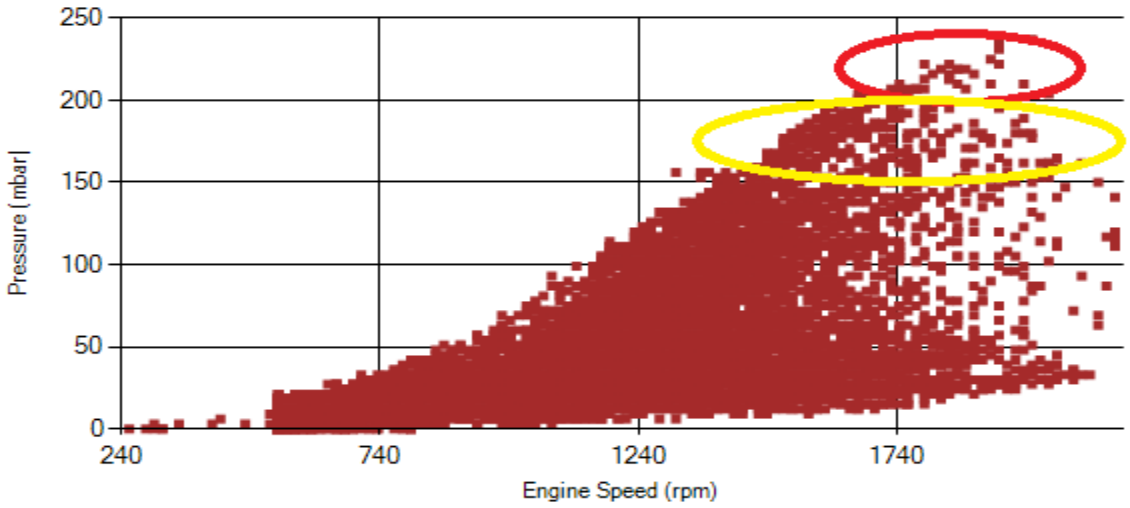


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

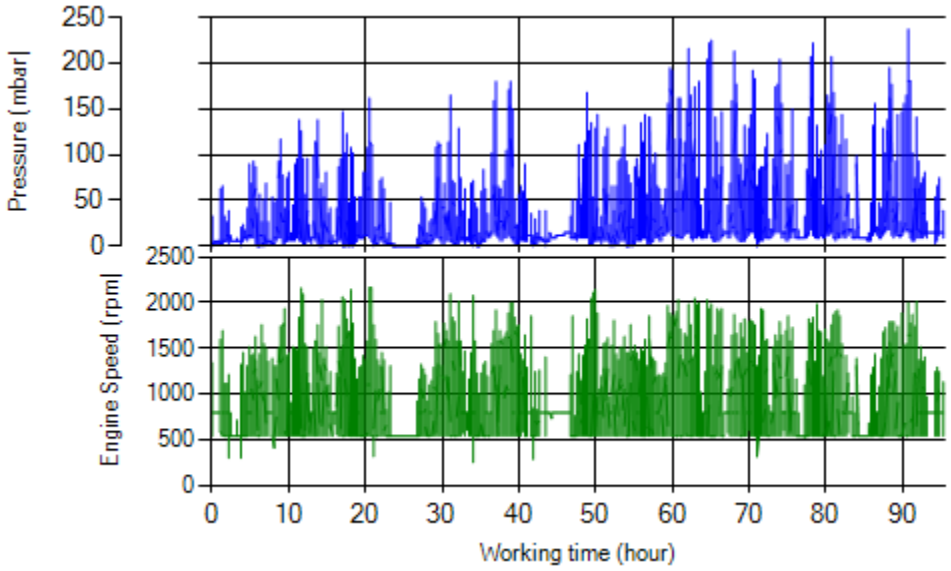


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

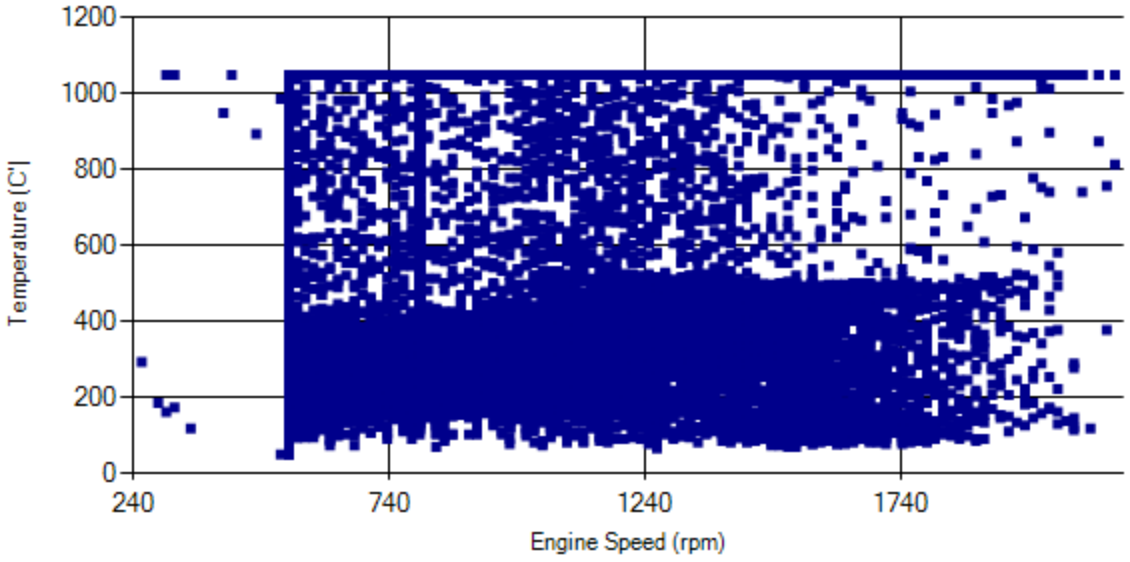


Figure 15- Temperature against engine speed

Notice: This diagrams unconventional appearance is because of temperature sensor problem.

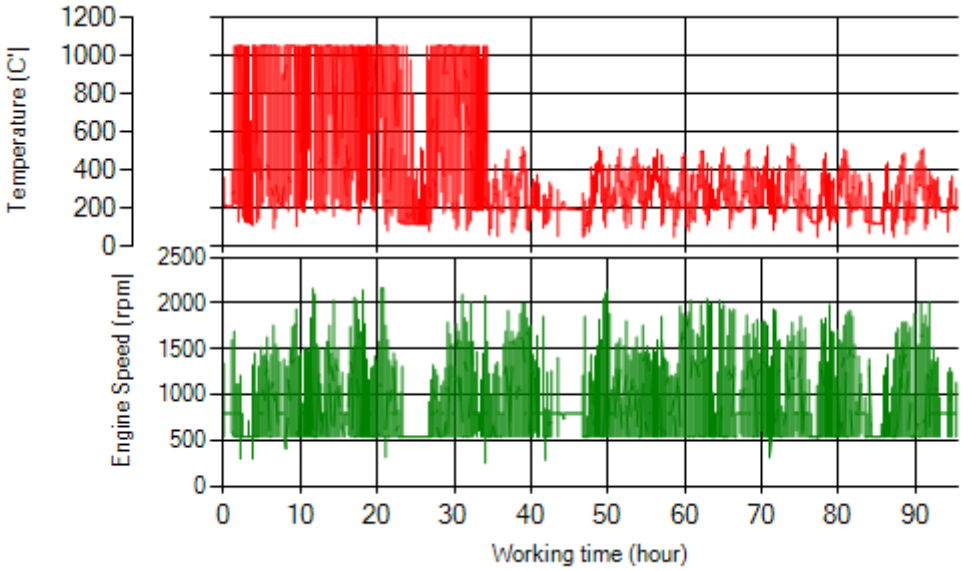


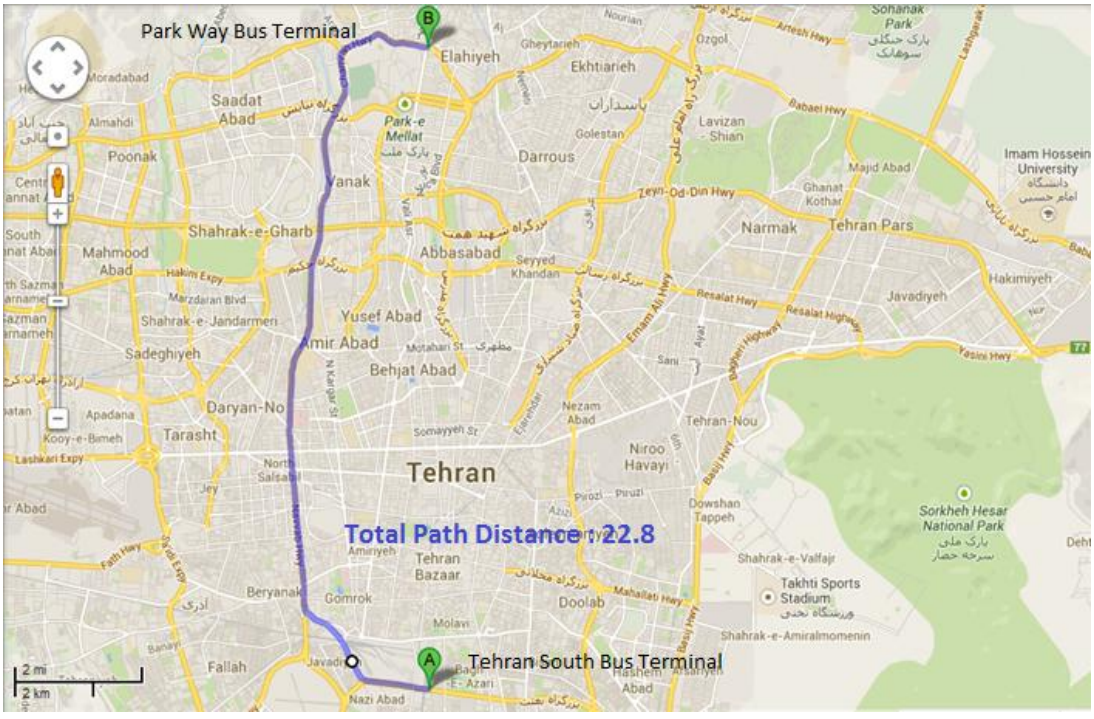
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.14% of total working time pressure is above 200 mbar and 1.39% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 10% of total working time temperature is above 400 ℃ and 18% above 350℃. This high temperature distribution is one of the important factors for filter excellent operation during the period.

Filter operation status	Excellent ☐ Good ■ Maintenance required ☐ Failed☐

Vehicle plate number	85423
Bus line	Number 4 (south to north bus line)
DPF producer company	HJS_02 (active system with FBC – electrical heater)



Overall Information

Table1- Overall Information

Vehicle plate number	85423
CPK data logger number	LN: 001505, DN: 2001, Sim Number +989218469621
Bus line	Number 4 (south to north bus line)
Bus Terminals	South Bus Terminal - Park Way Bus Tehran Terminal
Total path distance	22.8 km
DPF producer company	HJS_02 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	09/Aug/2015 – 15/Aug/2015 (seven days)*
K value - DPF upstream	1.00 [1/m]
K value – DPF downstream	0.00 [1/m]

Notice: Due to data logger problem, data missed from Aug 1st to Aug 8th.

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been working from installation date until now without any cleaning.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	29833 km
Bus mileage over the period	2435 km
Working days over the period	-
Stop days	-
Data logger working days	7 days
Working hours over the period	-
Average working hours per day (including stop days)	-
Bus average speed	-
idle speed time to all working time ration	50.6 %
Total Bus fuel consumption over the period	1575 lit
Fuel consumption per hour	-
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	0.756 lit
Average additive consumption	310 cc/km
Additive consumption to fuel ration	480 cc per 1000 lit (batch dosing with tank level)

Notice: Due to data logger problem some data missed. So working hours and its related information are blank.

Temperature, Pressure and Engine Speed Overview

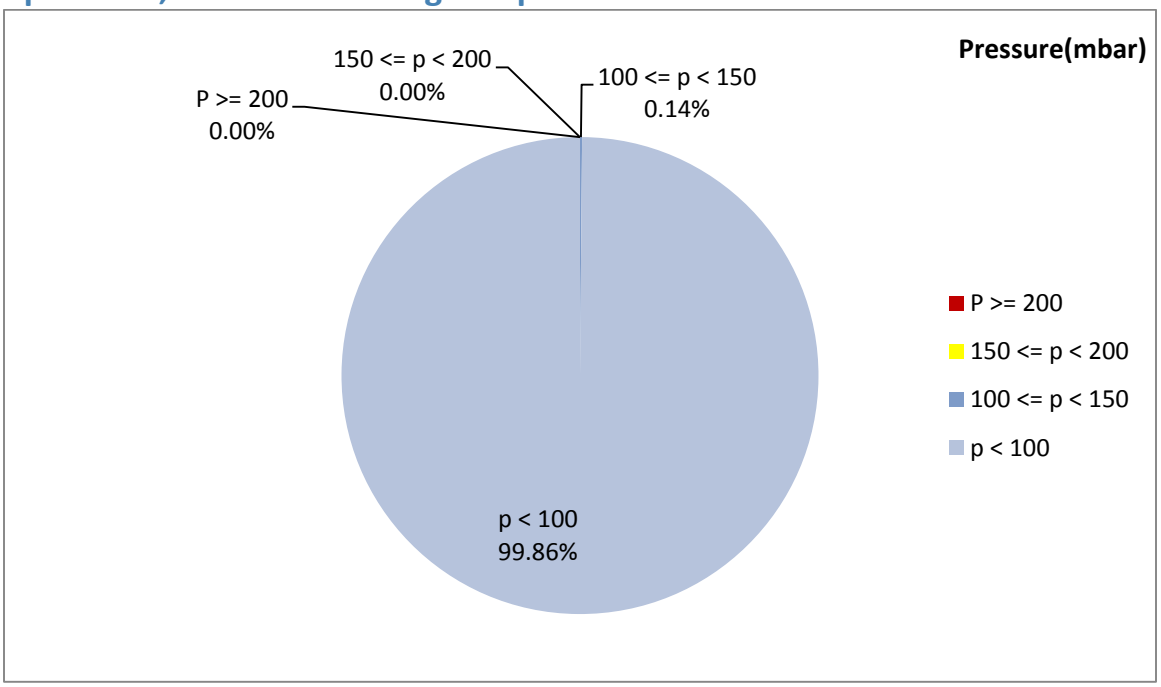


Figure 1- Pressure distribution over the working hours

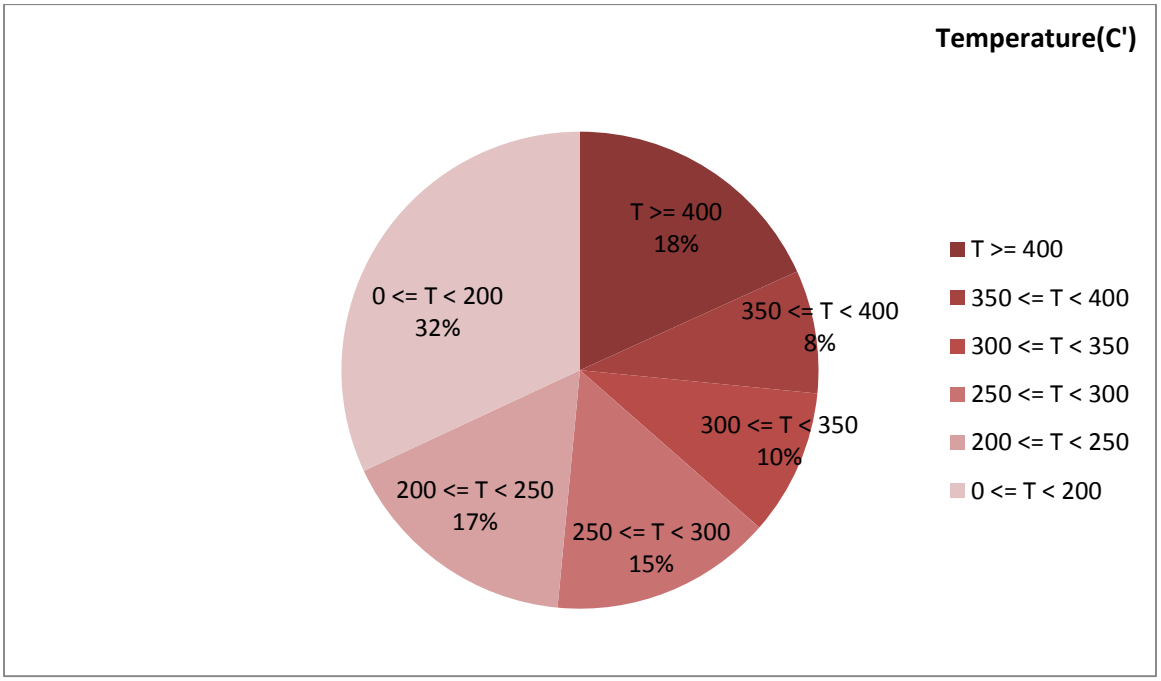


Figure 2-Temperature distribution over the working hours

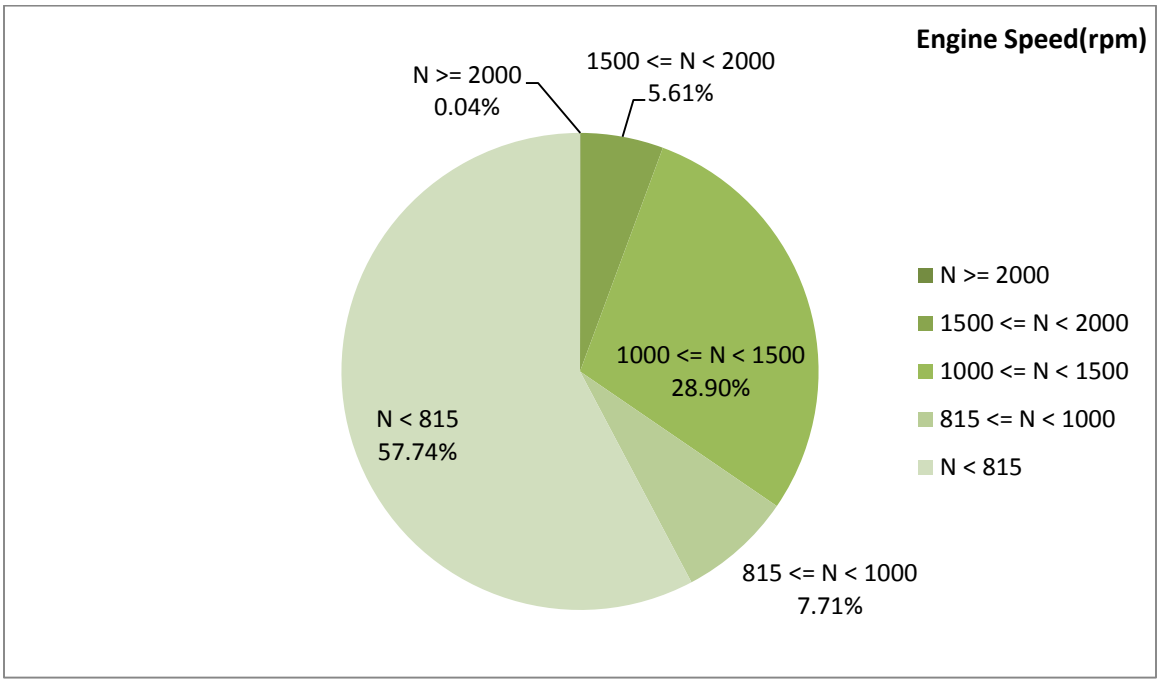


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
279.18	12.32	842

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
348.64	23.84	1144

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
686-50	129-0	2128-256

Detailed Pressure Analysis

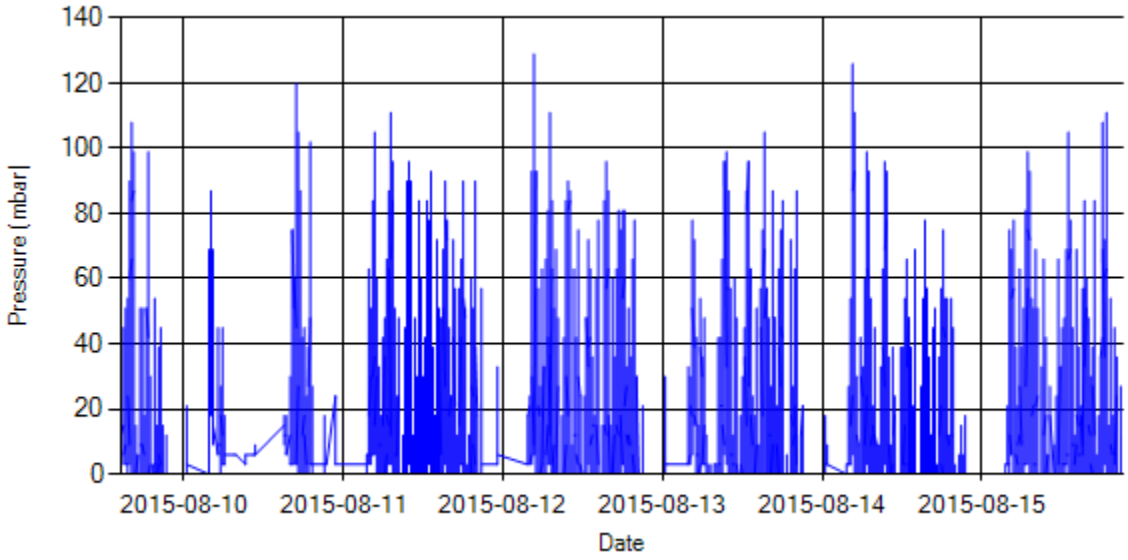


Figure 4- Pressure distribution over the period

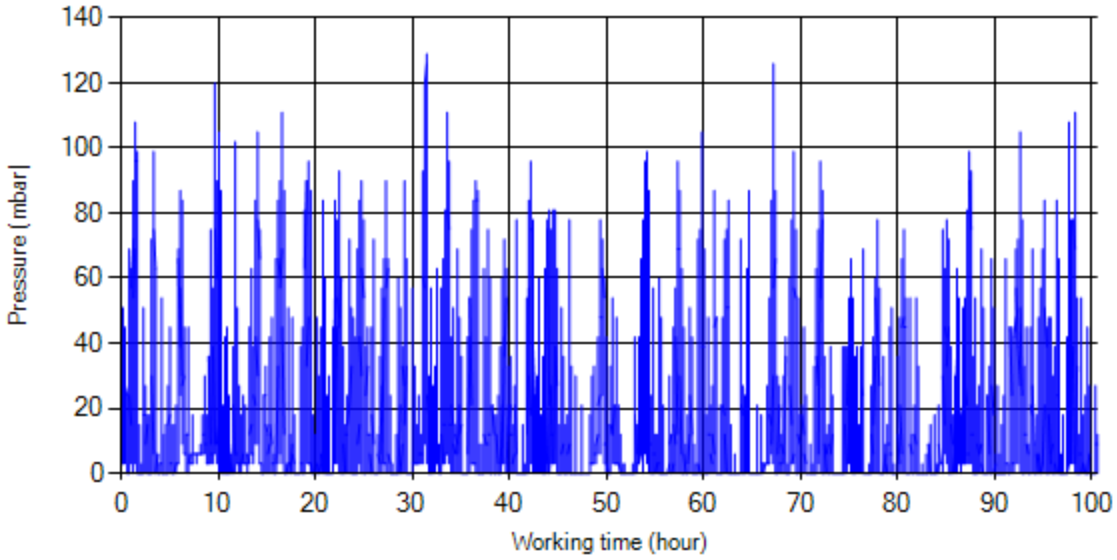


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

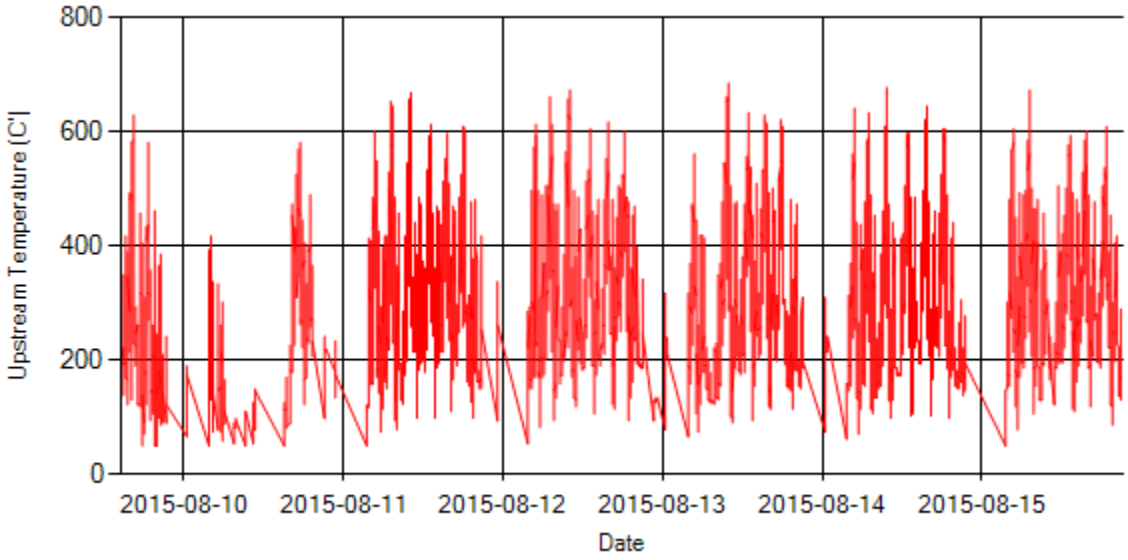


Figure 6- Temperature distribution over the period

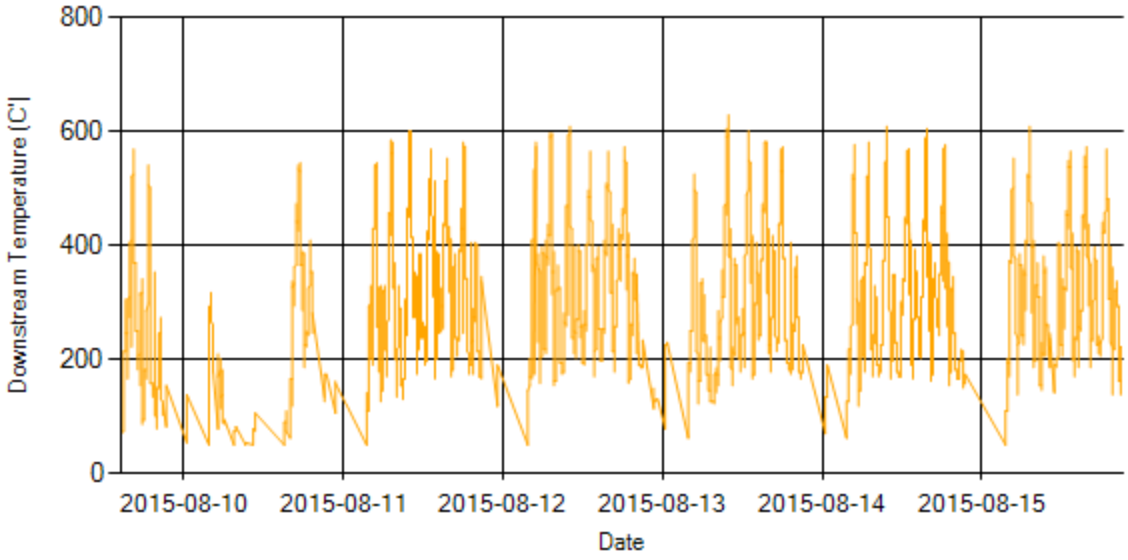


Figure 7- Temperature distribution over the period

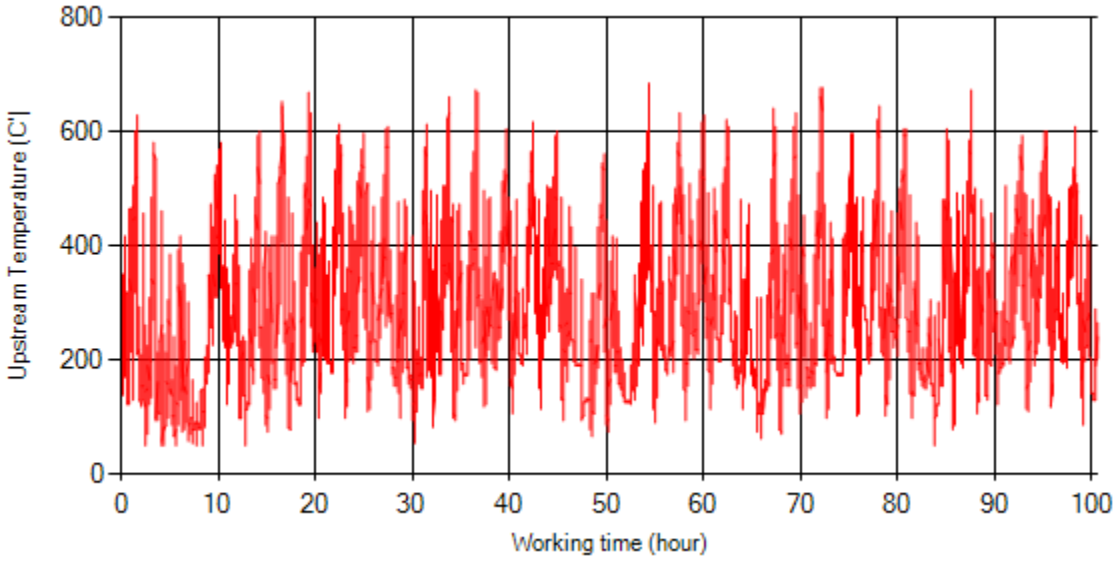


Figure 8- Temperature vs. working hours

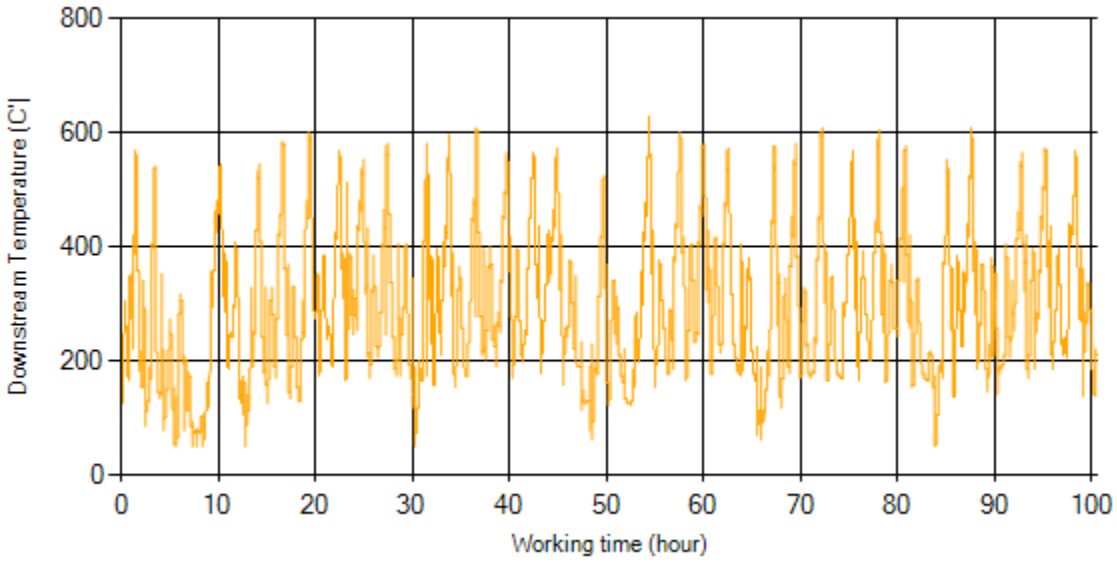


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

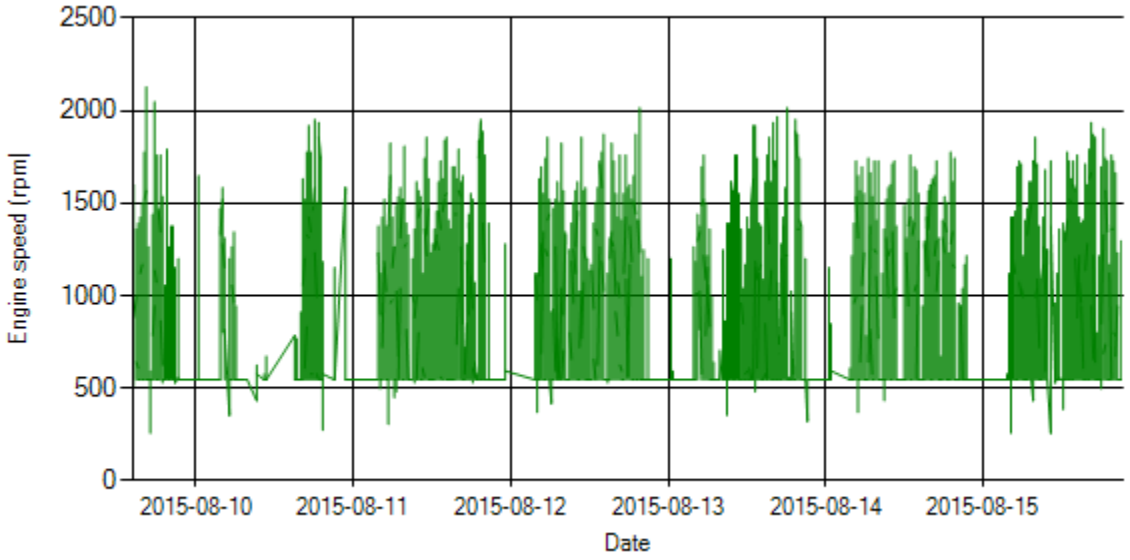


Figure 10- Engine speed distribution over the period

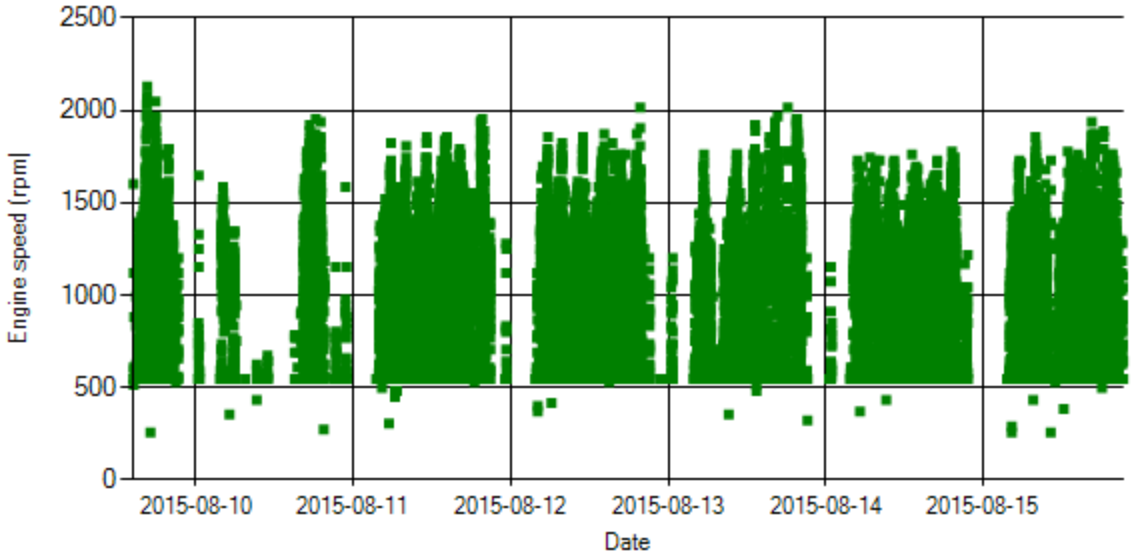


Figure 11- Engine speed diagram for calculating CPK's working days

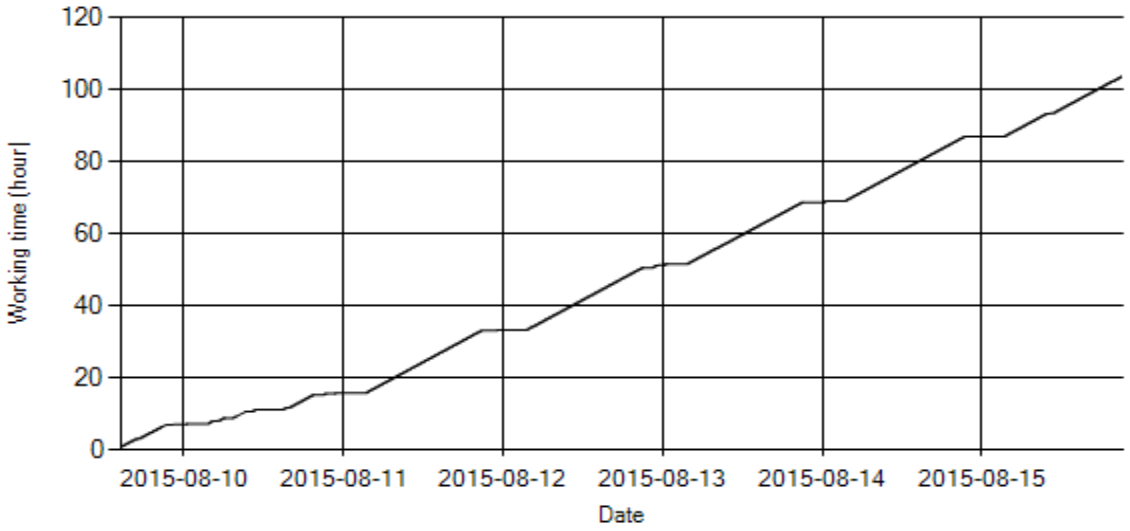


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger had problem from Aug 1st to 8th and didn't sample during these days period.

Pressure-Engine Speed diagrams

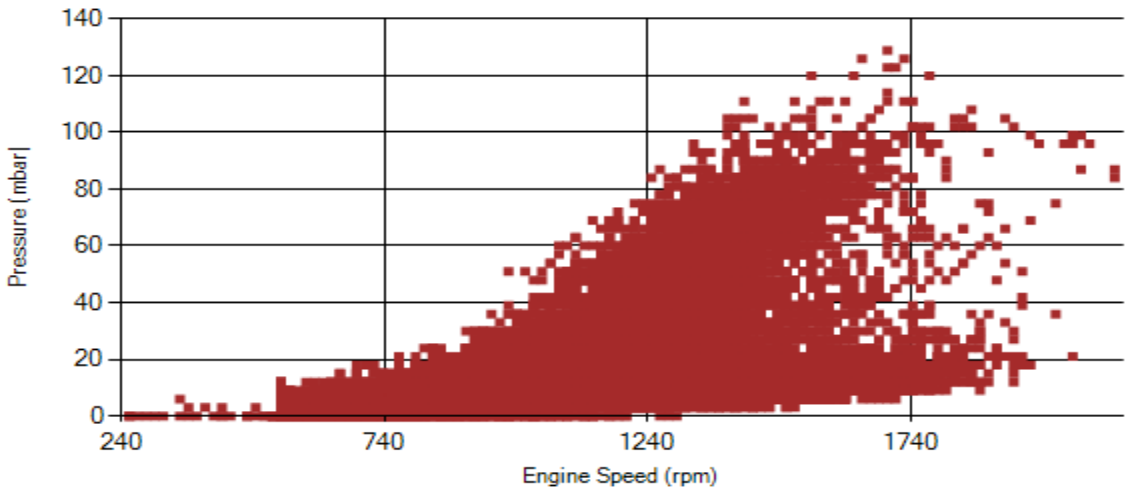


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges can't be observed during this period.

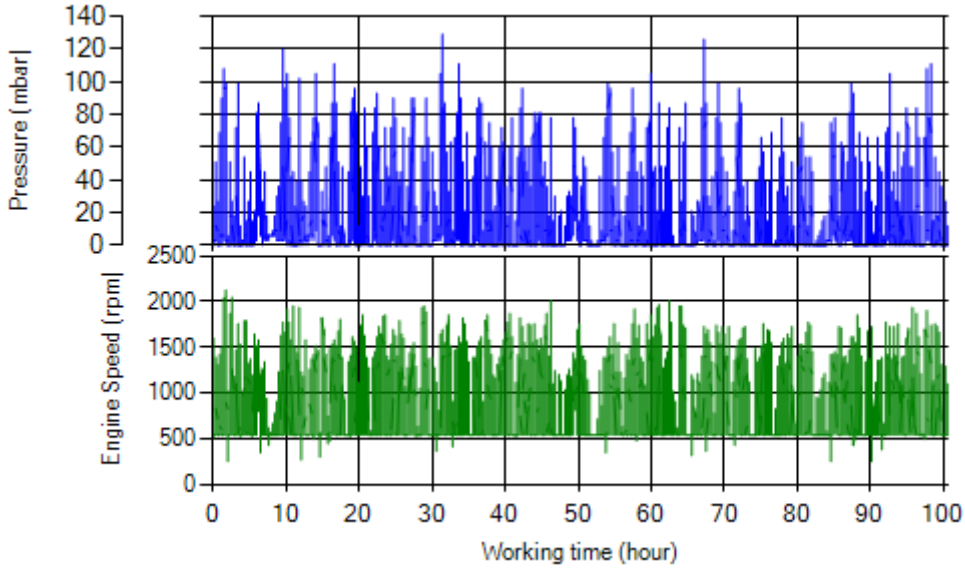


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

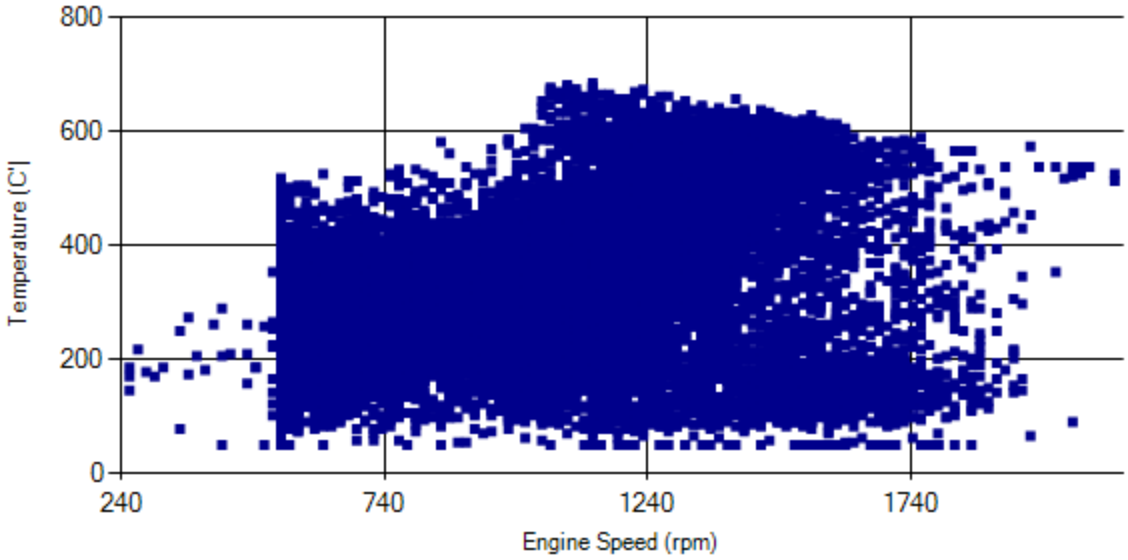


Figure 15- Temperature against engine speed

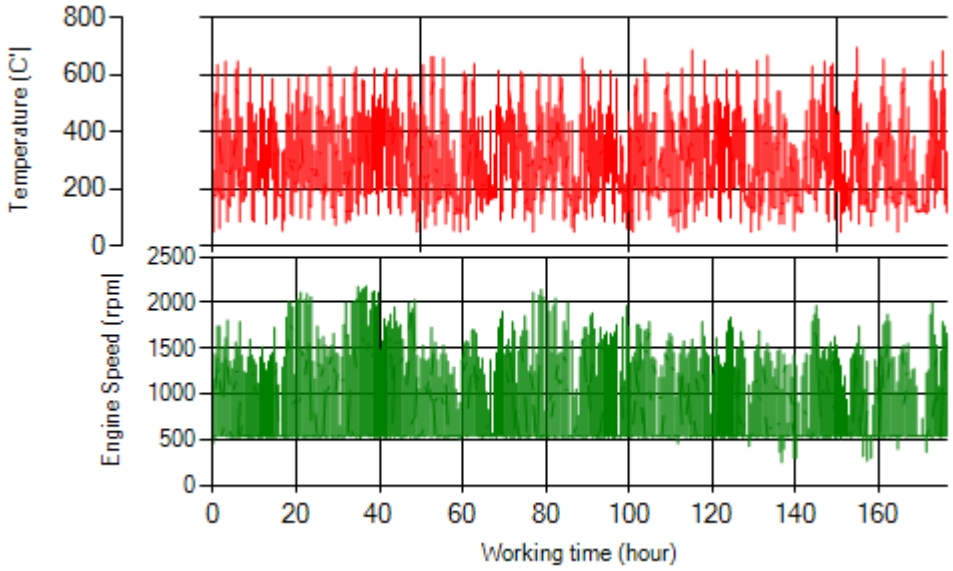


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, pressure above 150 mbar wasn't observed during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 18% of total working-time temperature is above 400 ℃ and 26% above 350℃.
- This vehicle operates in line 4, so due to path characteristic of this line, engine operates in high speed.

Filter operation status	Excellent ■ Good ☐ Maintenance required ☐ Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	85423
CPK data logger number	LN: 001505, DN: 2001, Sim Number +989218469621
Bus line	Number 4 (south to north bus line)
Bus Terminals	South Bus Terminal - Park Way Bus Tehran Terminal
Total path distance	22.8 km
DPF producer company	HJS_02 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Aug/2015- 31/Aug/2015 (sixteen days)
K value - DPF upstream	1.00 [1/m]
K value – DPF downstream	0.00 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been working from installation date until now without any cleaning.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	31817 km
Bus mileage over the period	1984 km
Working days over the period	11 days
Stop days	5 days
Data logger working days	11 days
Working hours over the period	130 hours 45 minutes
Average working hours per day (including stop days)	8 hours 10 minutes
Bus average speed	15.17 km/hr
idle speed time to all working time ration	52.77 %
Total Bus fuel consumption over the period	1227 lit
Fuel consumption per hour	9.38 lit/hr
Average fuel consumption	0.62 lit/km
Total Bus additive consumption over the period	0.595 lit
Average additive consumption	300 cc/km
Additive consumption to fuel ration	485 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

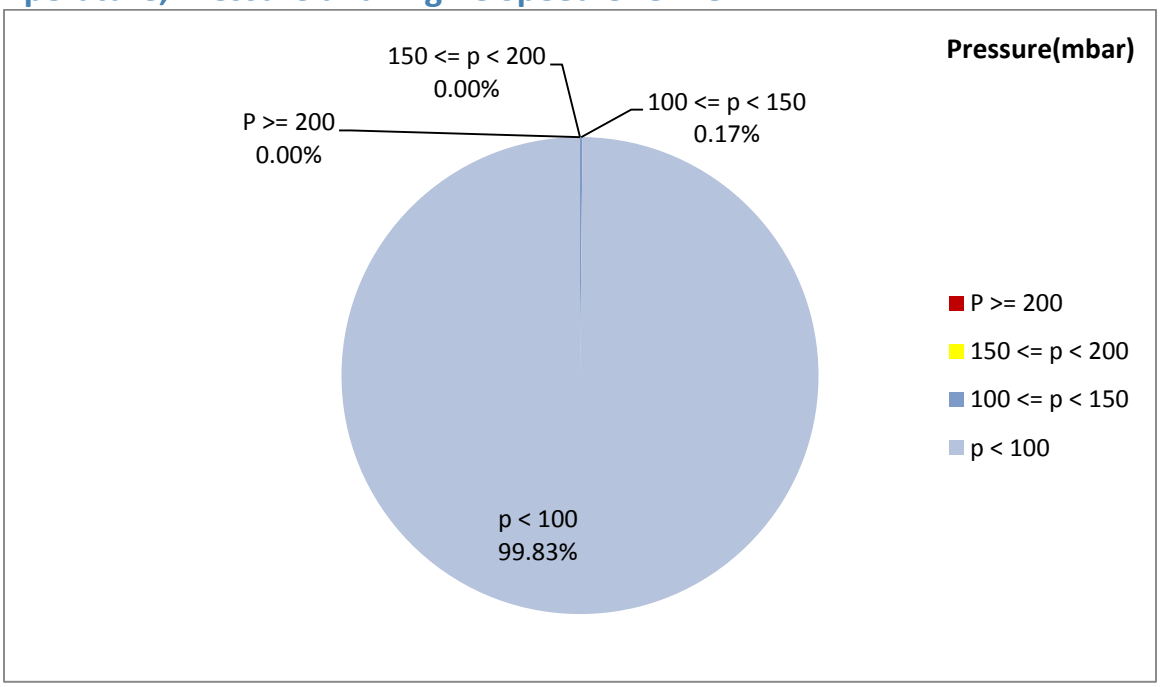


Figure 1- Pressure distribution over the working hours

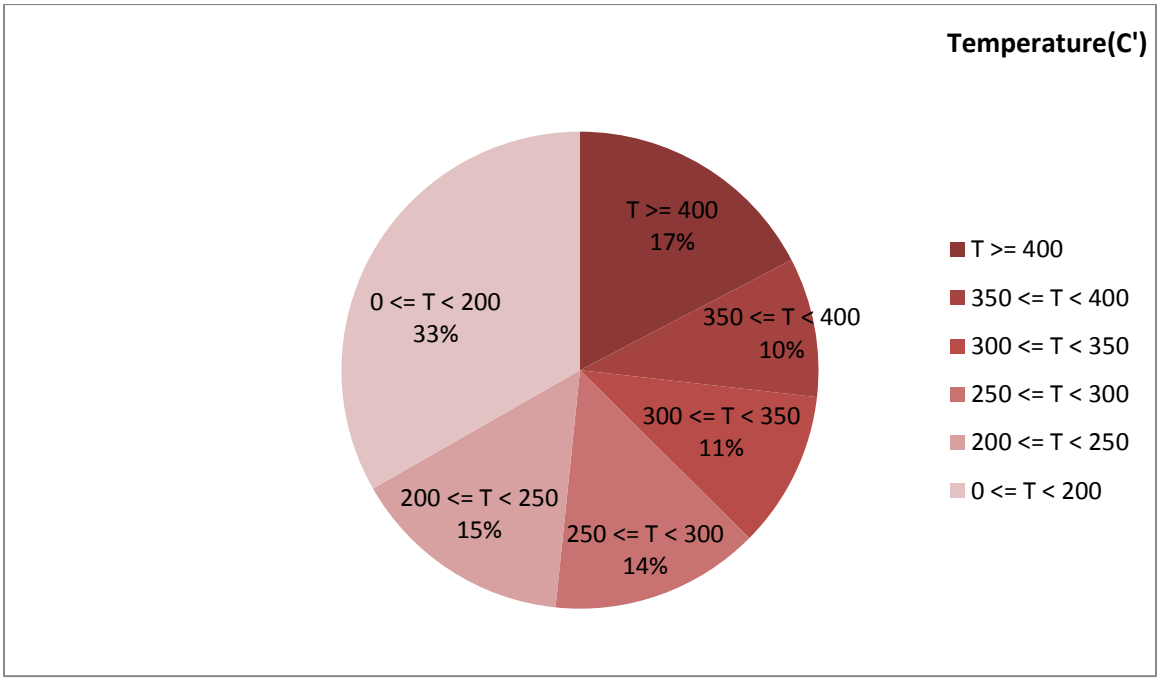


Figure 2-Temperature distribution over the working hours

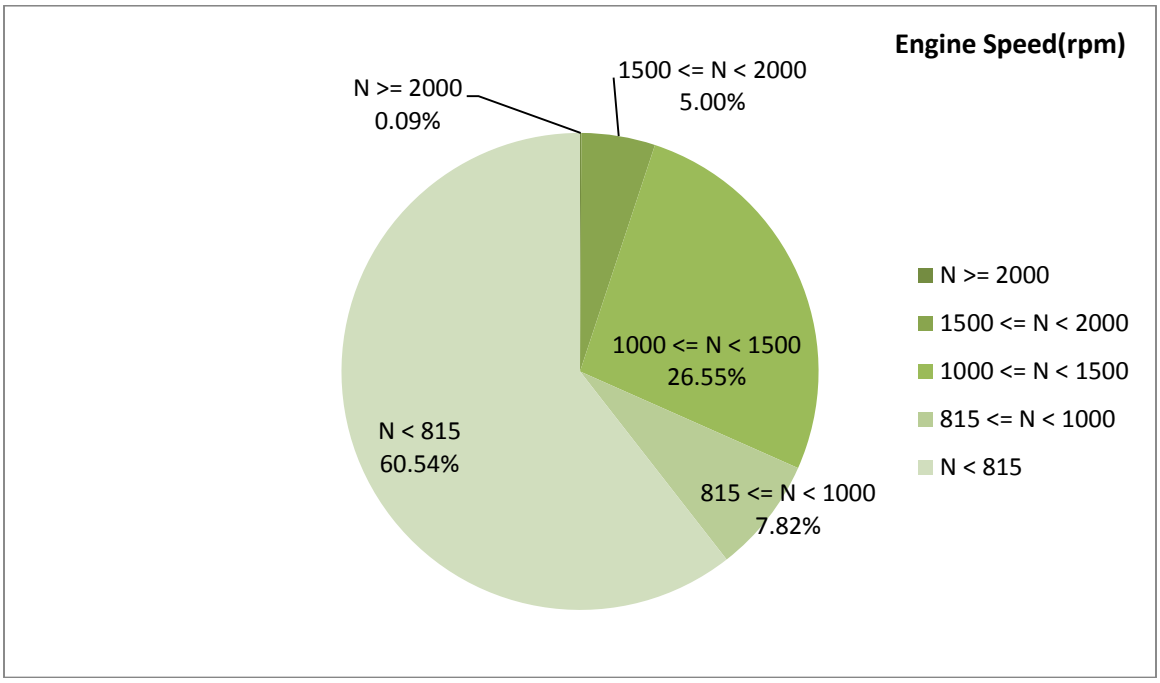


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
278.45	11.53	822

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
356.9	23.26	1129

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
698-50	138-0	2144-256

Detailed Pressure Analysis

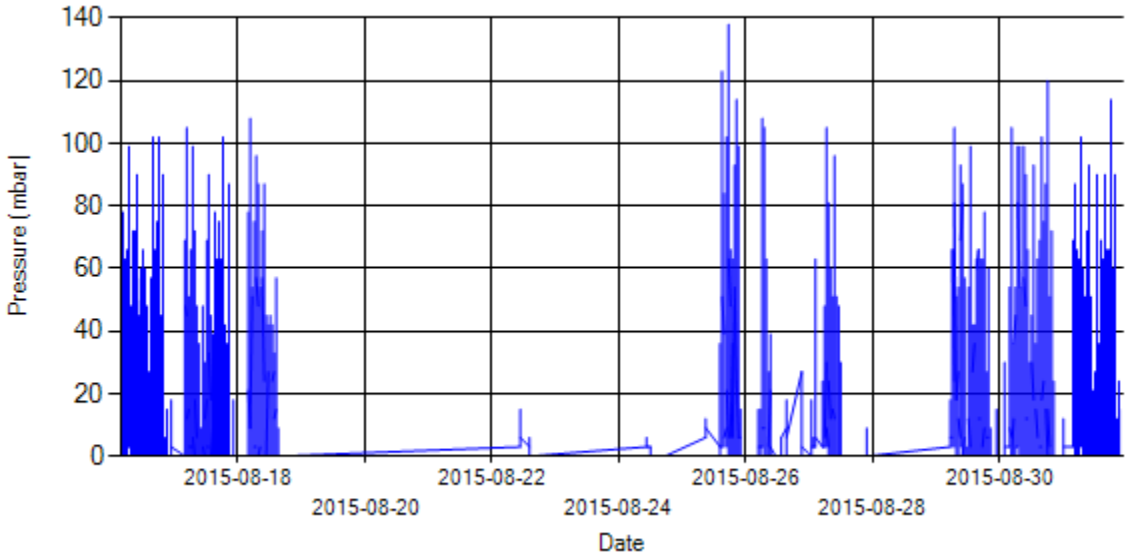


Figure 4- Pressure distribution over the period

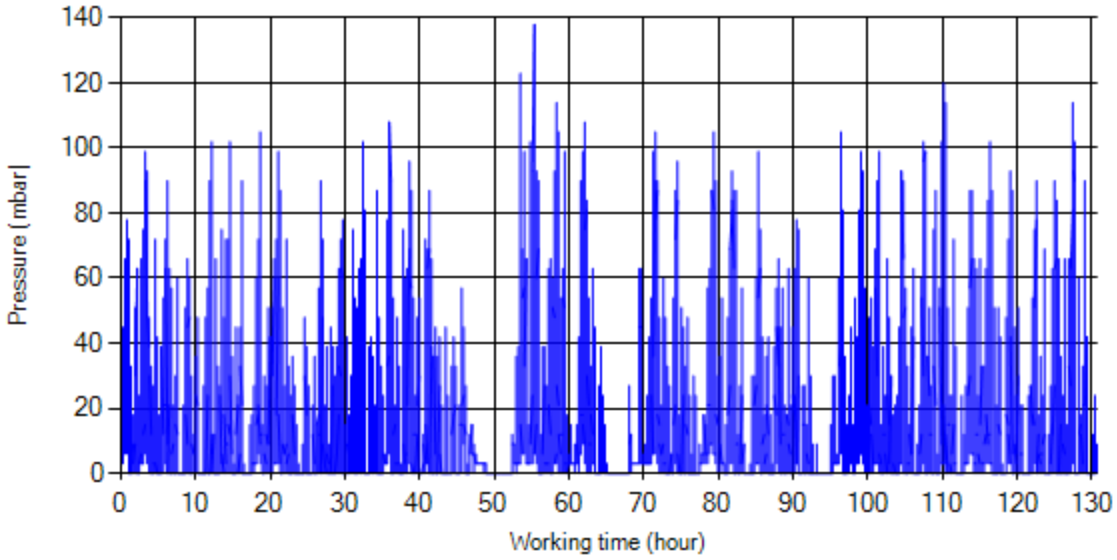


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

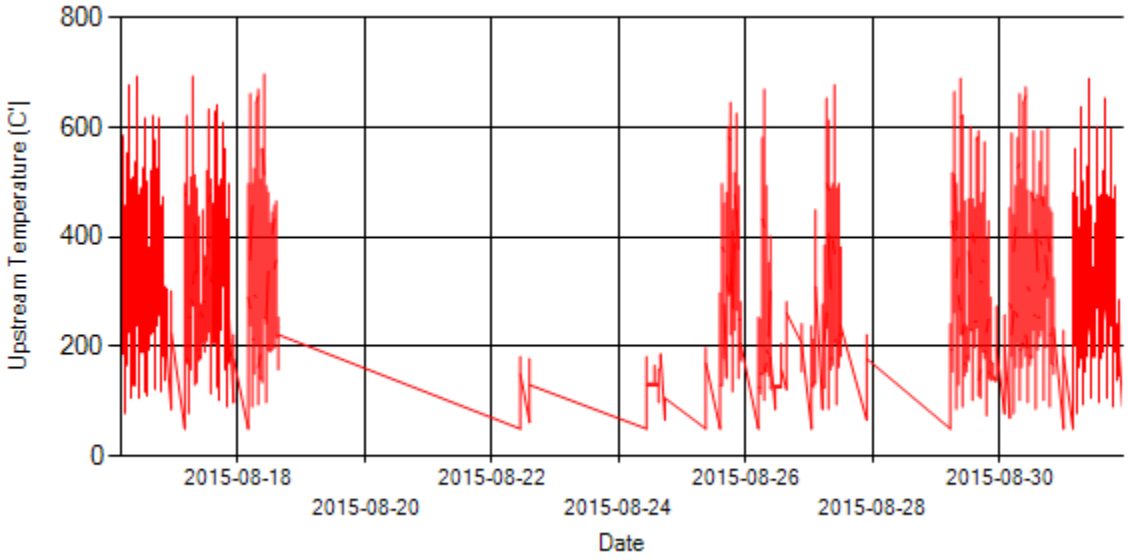


Figure 6- Temperature distribution over the period

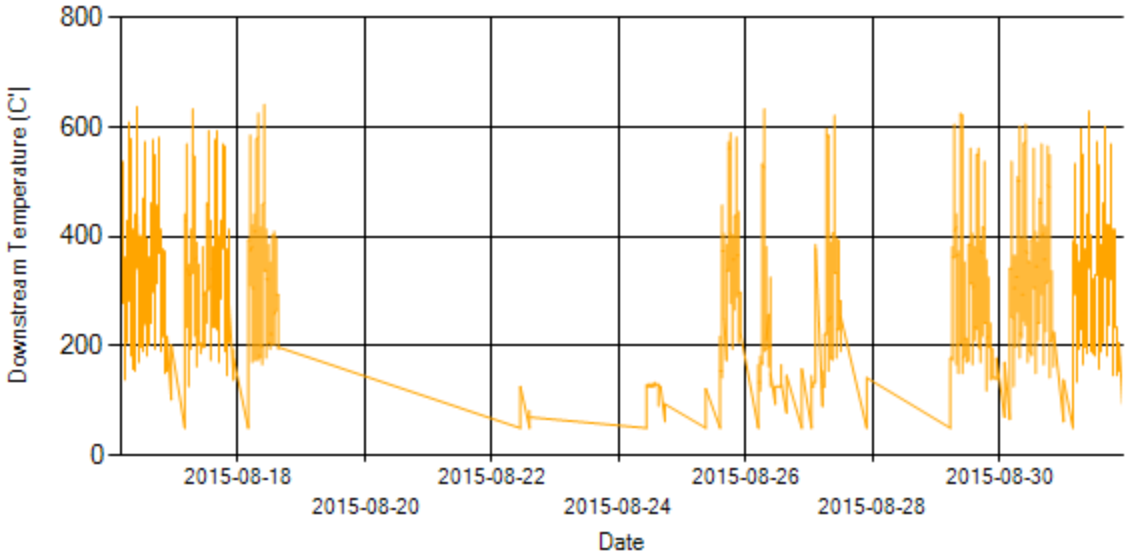


Figure 7- Temperature distribution over the period

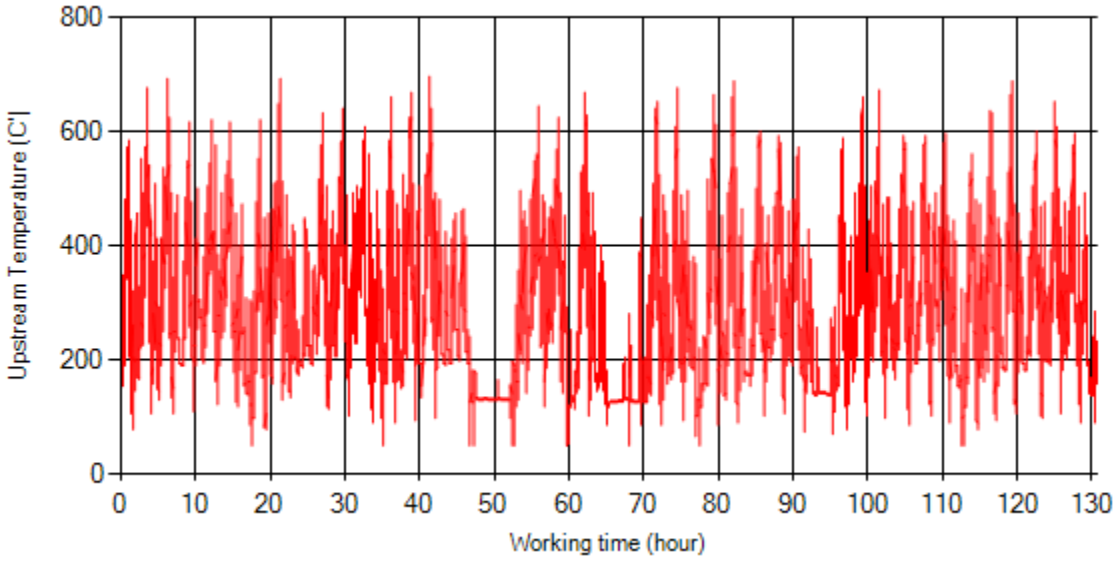


Figure 8- Temperature vs. working hours

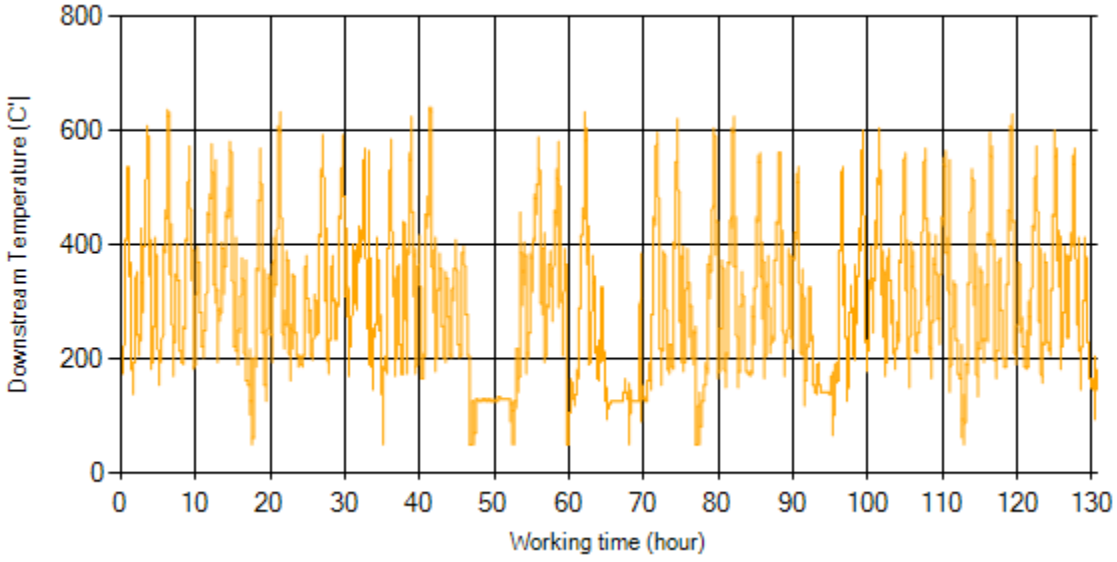


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

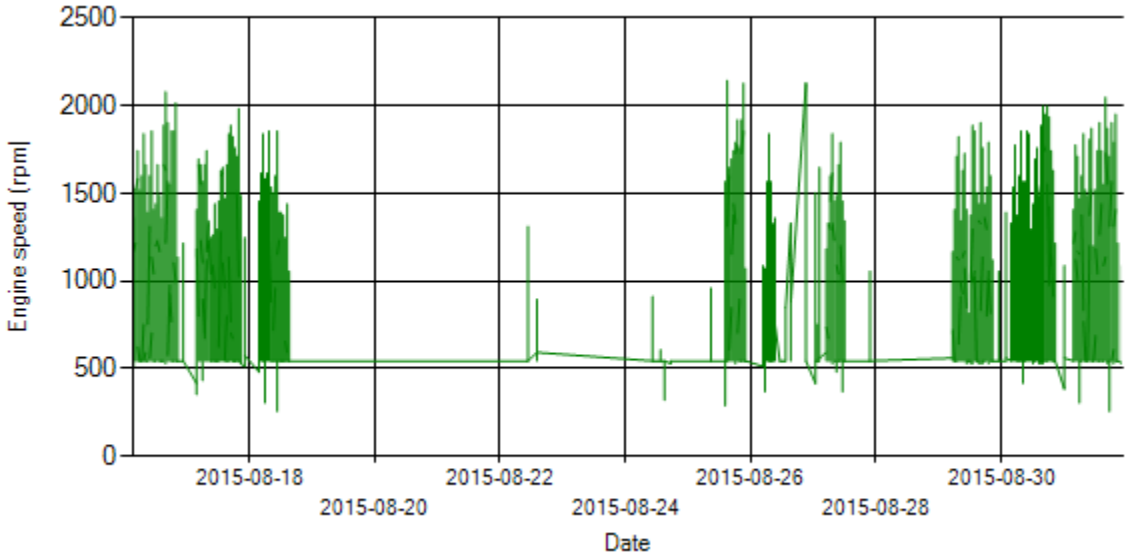


Figure 10- Engine speed distribution over the period

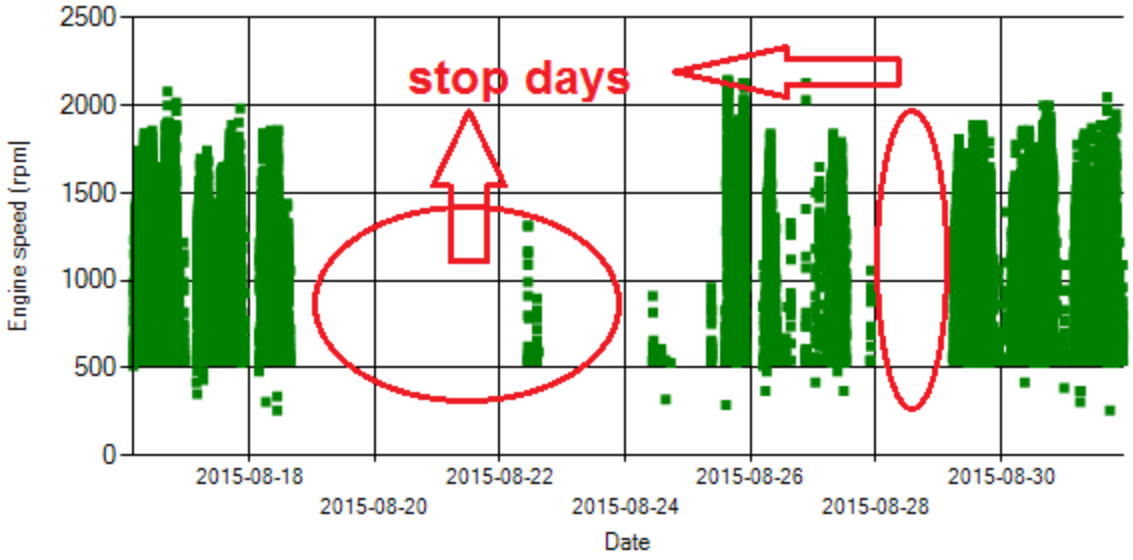


Figure 11- Engine speed diagram for calculating CPK's working days

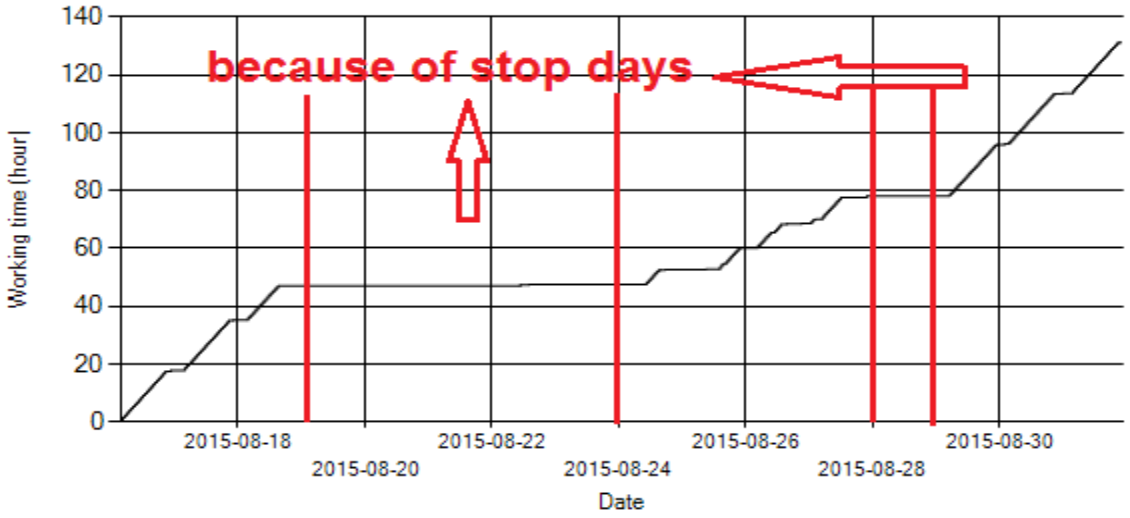


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data.

Pressure-Engine Speed diagrams

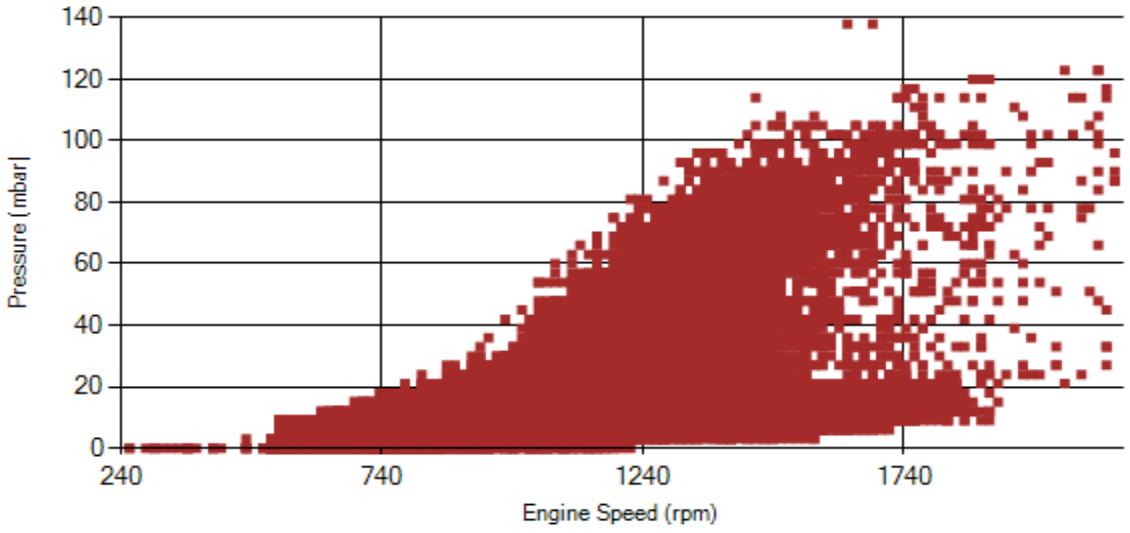


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges can't be observed during this period.

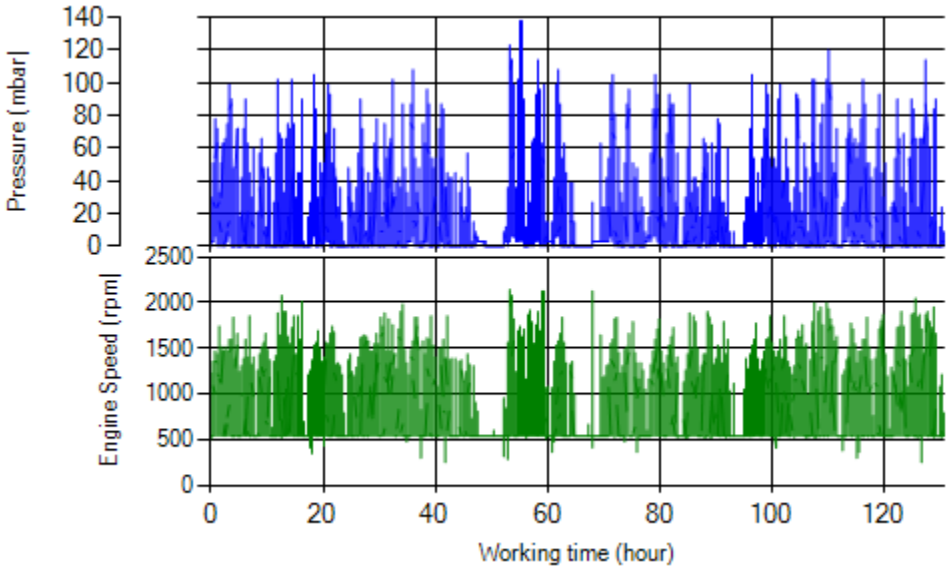


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

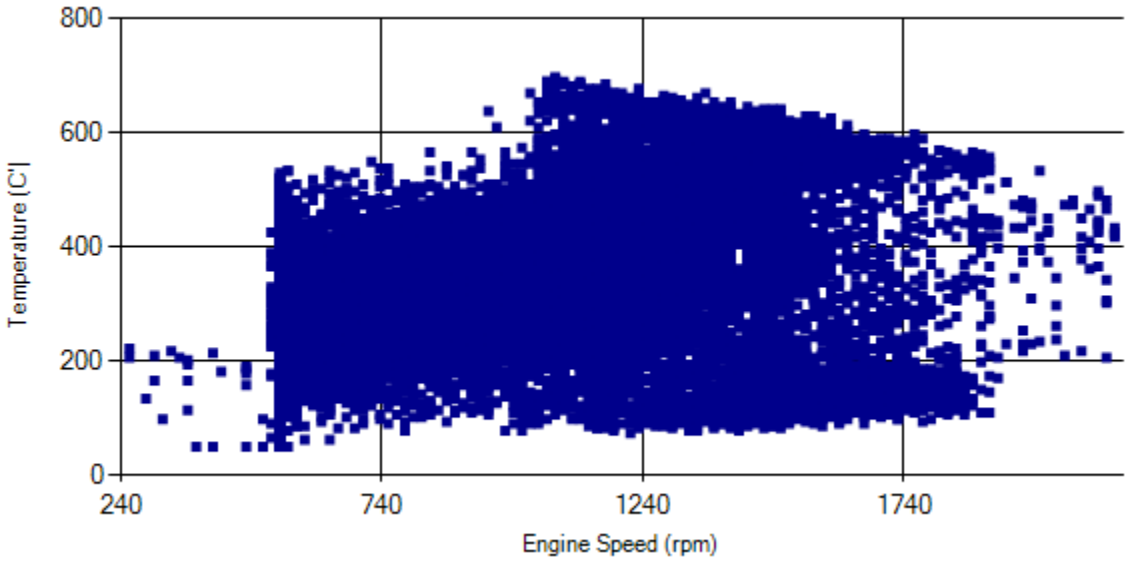


Figure 15- Temperature against engine speed

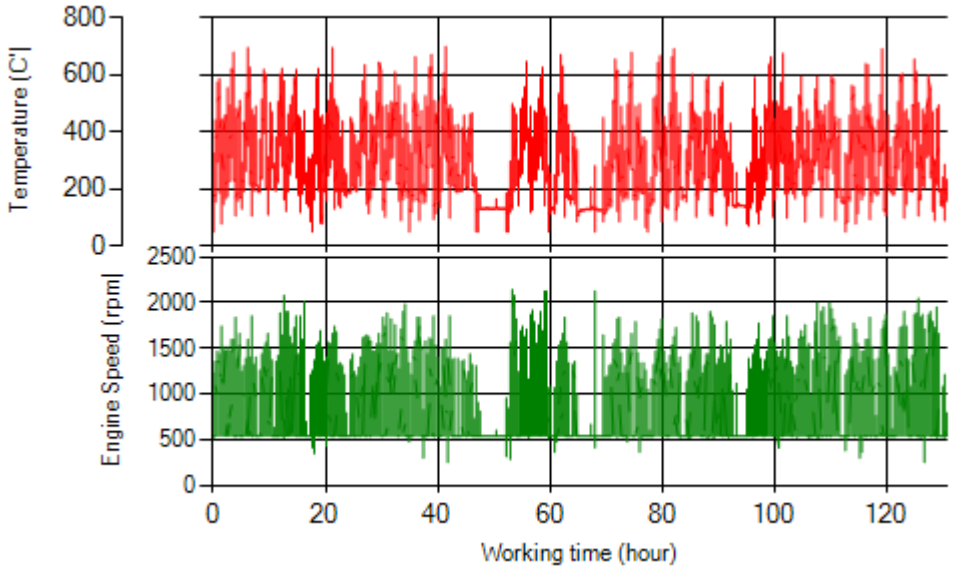


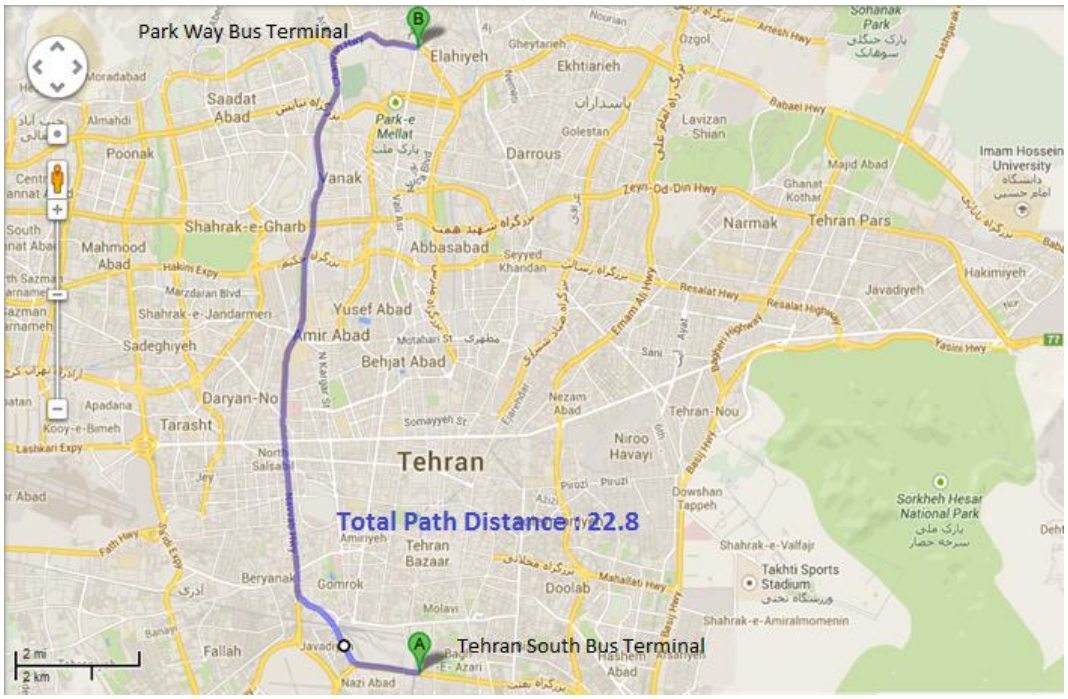
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, pressure above 150 mbar wasn't observed during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 17% of total working-time temperature is above 400 ℃ and 27% above 350℃.
- This vehicle operates in line 4, so due to path characteristic of this line, engine operates in high speed.

Filter operation status	Excellent ■ Good ☐ Maintenance required ☐ Failed☐

Vehicle plate number	78515
Bus line	Number 4 (south to north bus line)
DPF producer company	Dinex_01 (Passive system with FBC)



Overall Information

Table1- Overall Information

Vehicle plate number	78515
CPK data logger number	LN: 001490, DN: 1954, Sim Number +98000000000
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	Dinex_01 (passive system with FBC)
Installation date	22/Oct/2014
Report period	01/Aug/2015 – 15/Aug/2015 (fifteen days)
K value - DPF upstream	1.24 [1/m]
K value – DPF downstream	0.00 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	Filter core was changed on 15/Feb/2015.
Dosing status	Dosing value was reduced by 70% on March February 15th. (Secondary value/Initial value=0.3)

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	42955 km
Bus mileage over the period	2647 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	169 hours 33 minutes
Average working hours per day (including stop days)	11 hours 18 minutes
Bus average speed	15.61 km/hr
idle speed time to all working time ration	53.04 %
Total Bus fuel consumption over the period	1785 lit
Fuel consumption per hour	10.53 lit/hr
Average fuel consumption	0.67 lit/km
Total Bus additive consumption over the period	0.455 lit
Average additive consumption	172 cc/km
Additive consumption to fuel ration	255 cc per 1000 lit (continuous dosing)

Temperature, Pressure and Engine Speed Overview

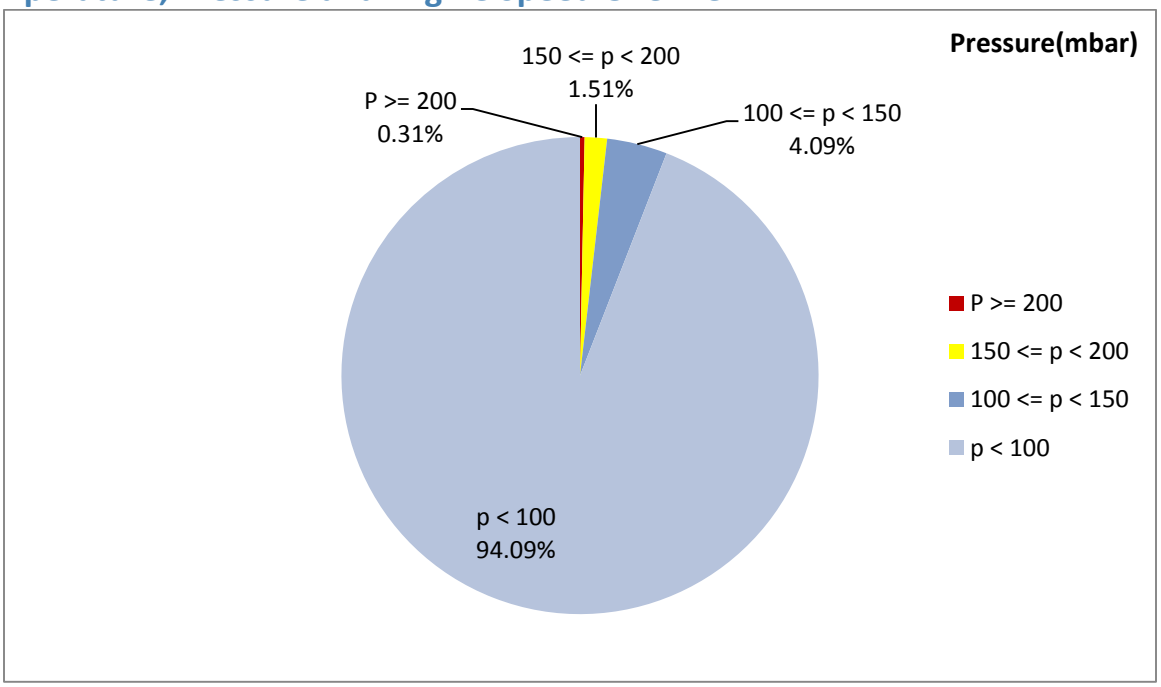


Figure 1- Pressure distribution over the working hours

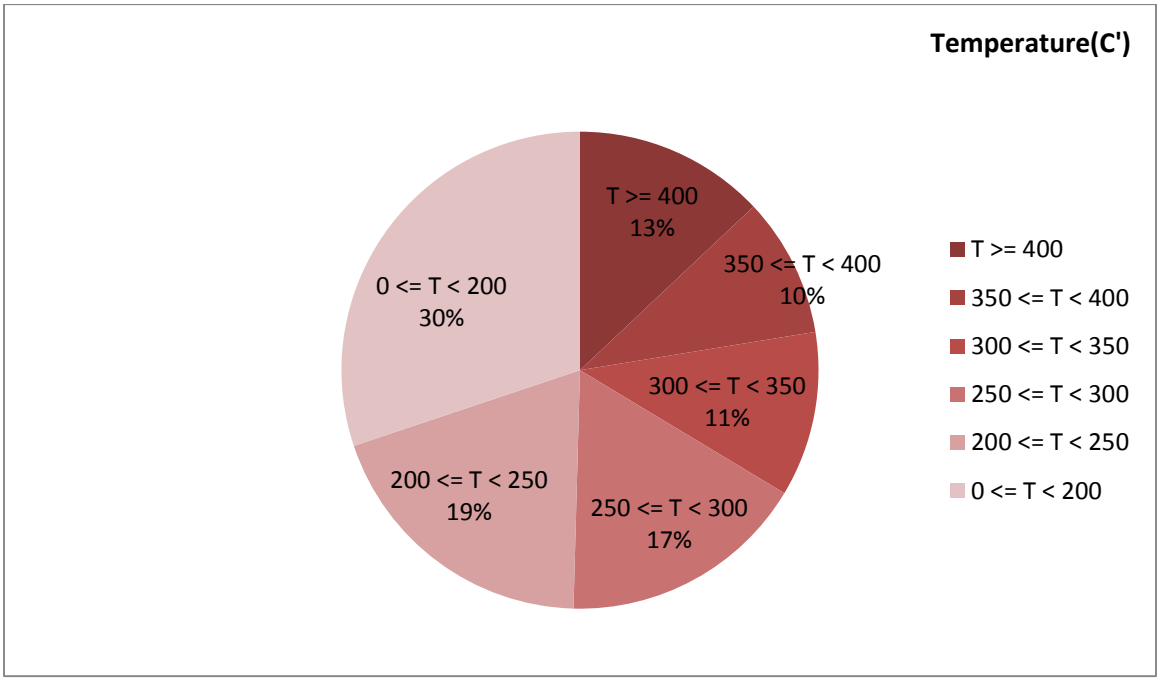


Figure 2-Temperature distribution over the working hours

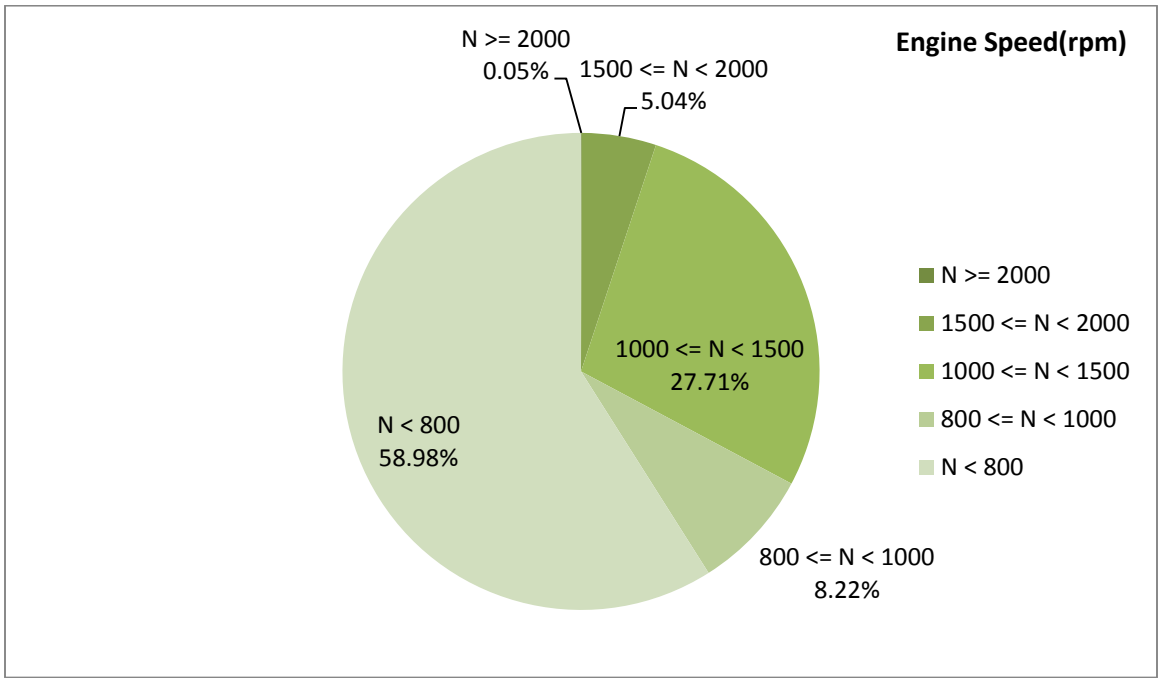


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
268.83	28.48	825

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
324.98	50.73	1135

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
590-50	276-0	2112-304

Detailed Pressure Analysis

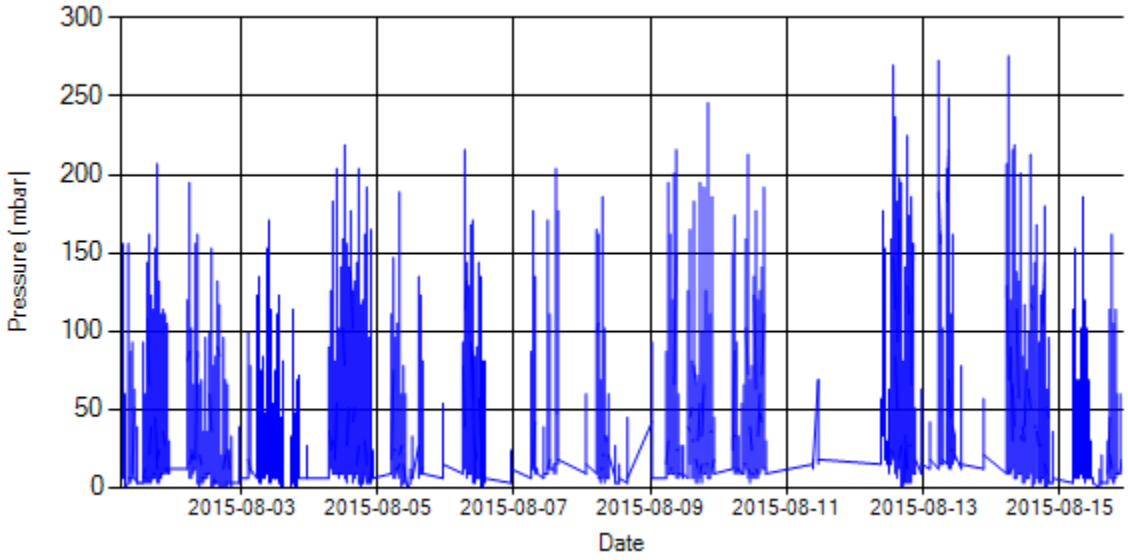


Figure 4- Pressure distribution over the period

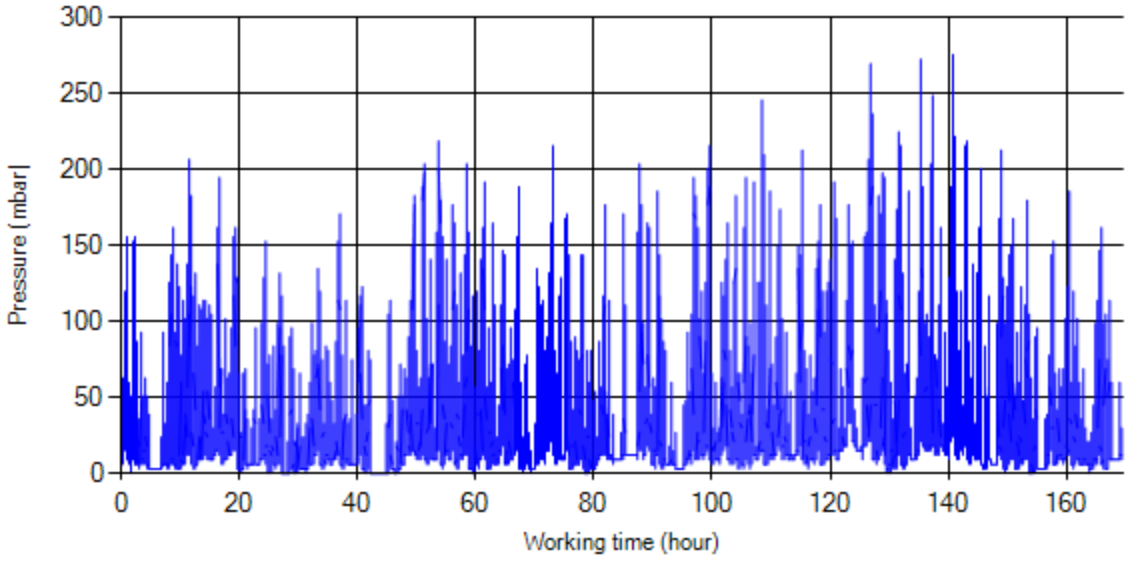


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

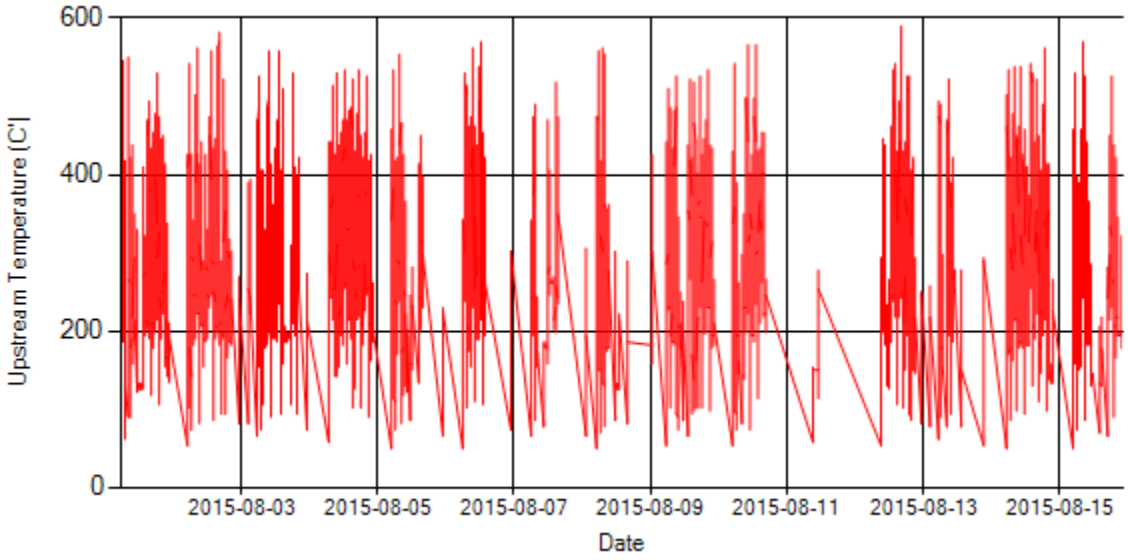


Figure 6- Temperature distribution over the period

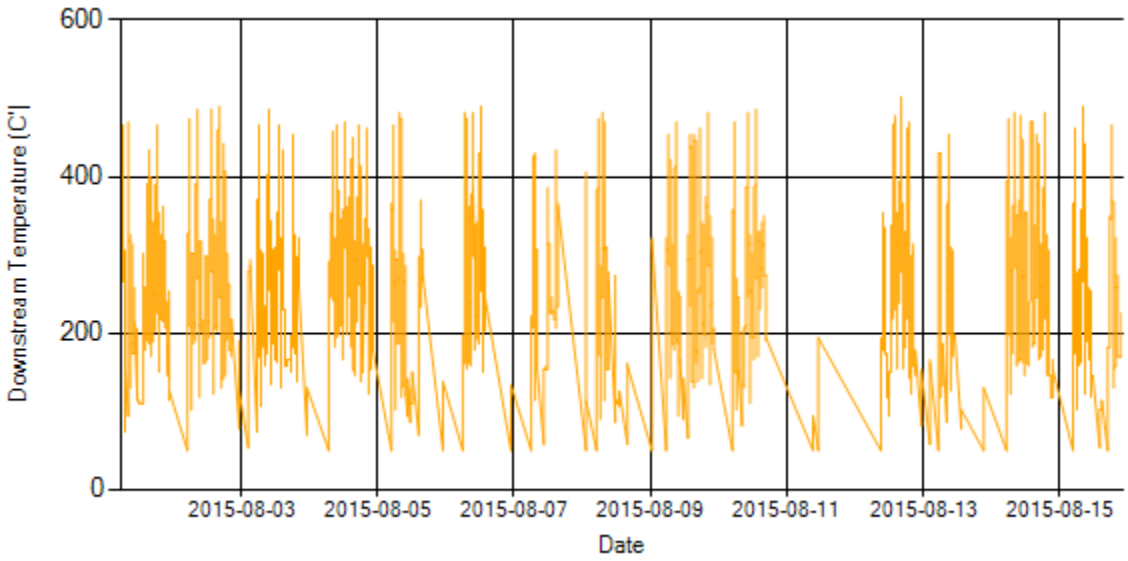


Figure 7- Temperature distribution over the period

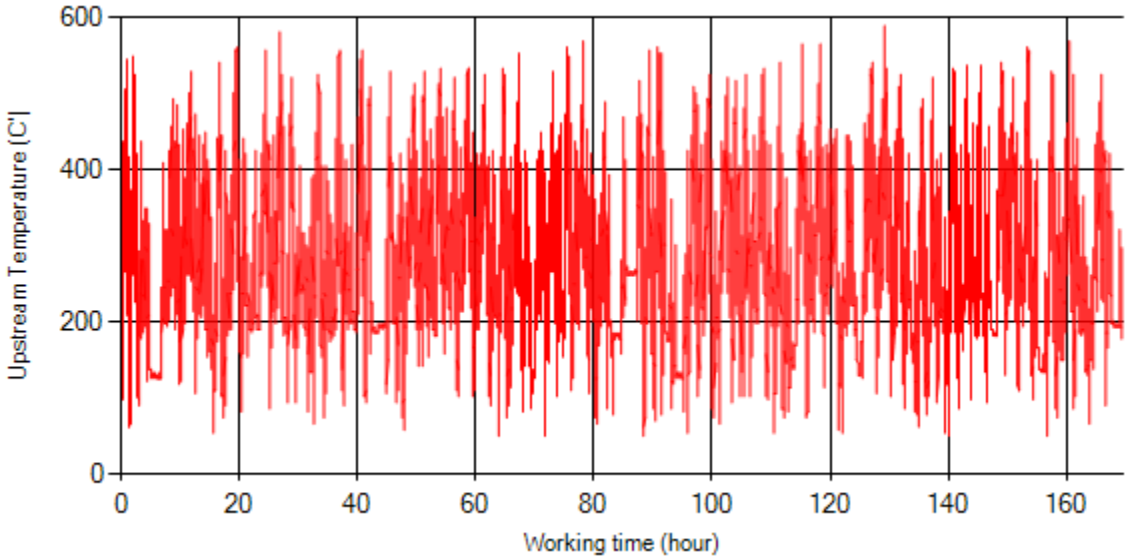


Figure 8- Temperature vs. working hours

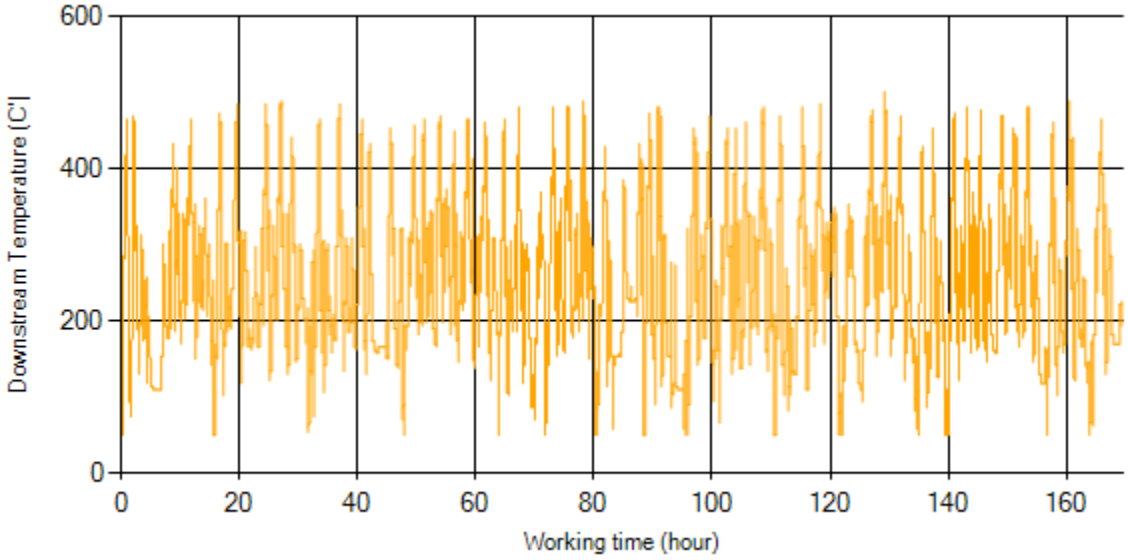


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

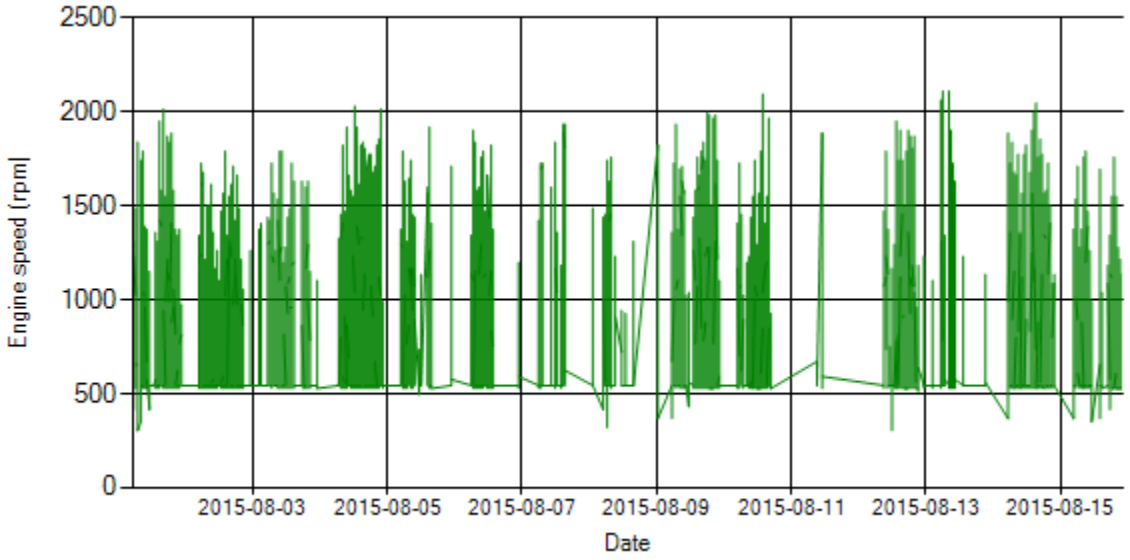


Figure 10- Engine speed distribution over the period

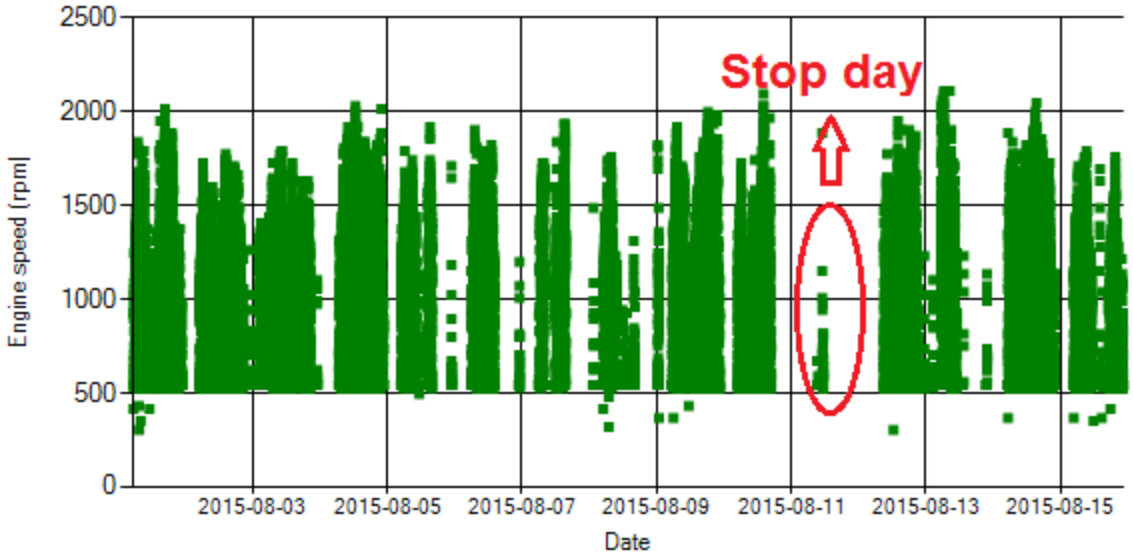


Figure 11- Engine speed diagram for calculating CPK's working days

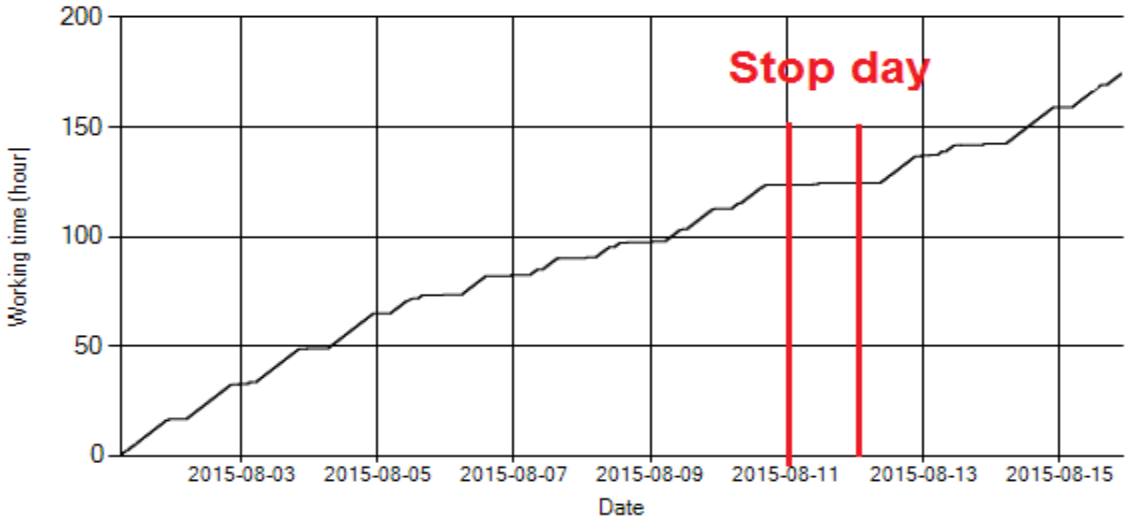


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, Aug 11th was stop day.

Pressure-Engine Speed diagrams

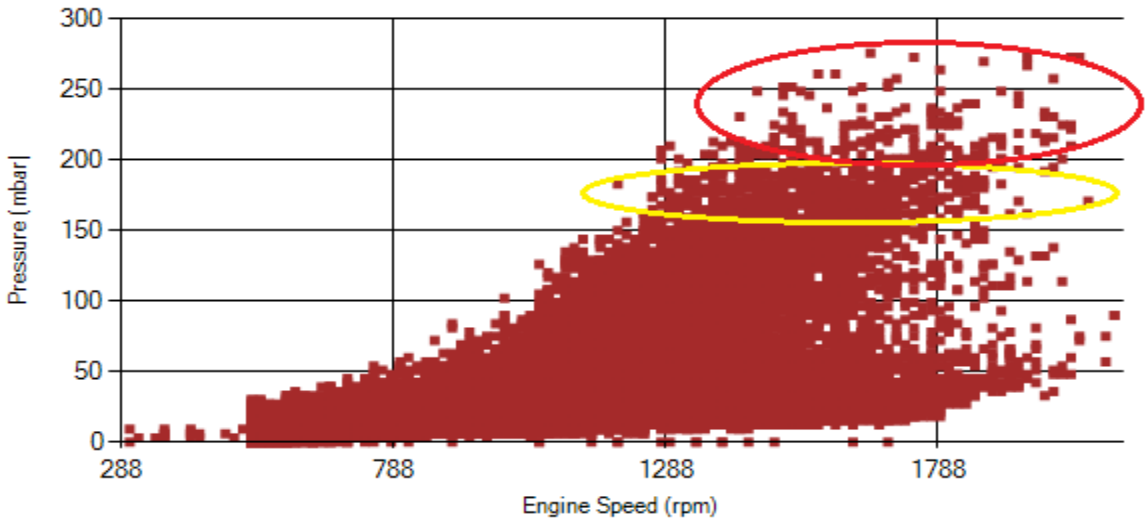


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

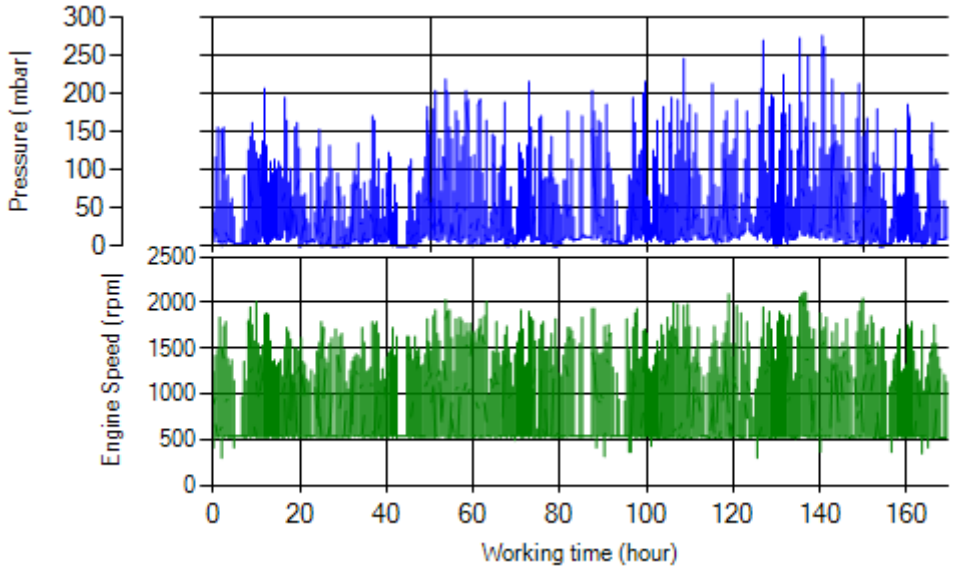


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

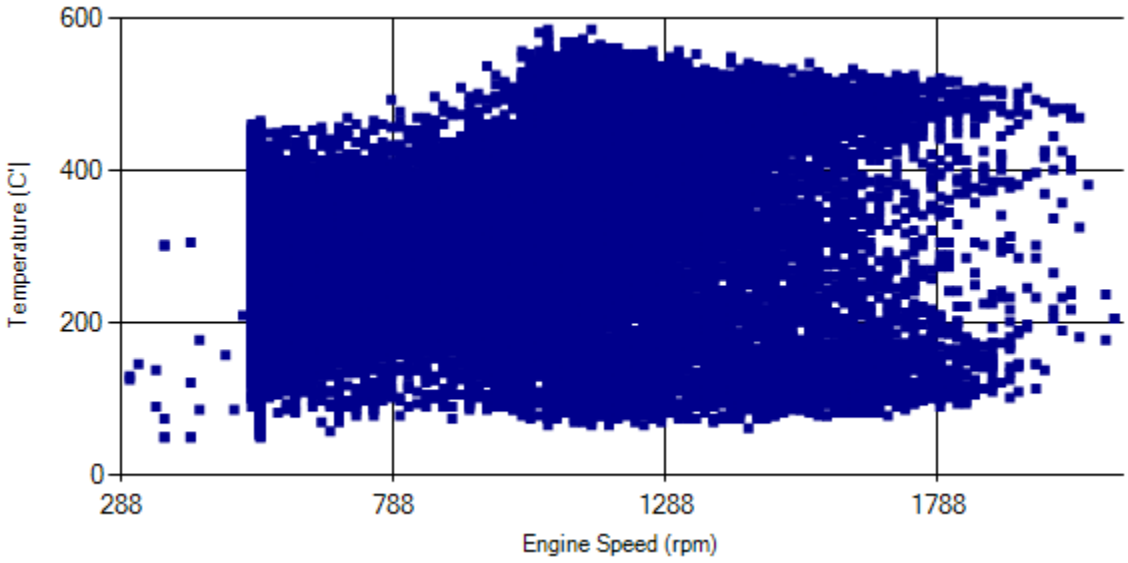


Figure 15- Temperature against engine speed

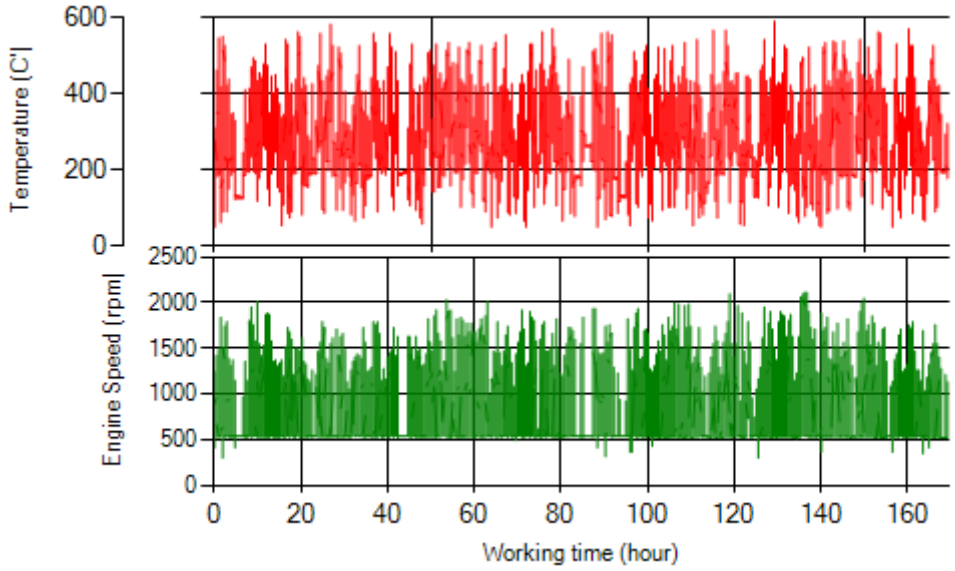


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.31% of working time pressure was above 200 mbar and only 1.82% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 13% of total working time, temperature is above 400 ℃ and 23% above 350℃.

Filter operation status	Excellent ☐	Good ■
	Maintenance required ☐	Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	78515
CPK data logger number	LN: 001490, DN: 1954, Sim Number +98000000000
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	Dinex_01 (passive system with FBC)
Installation date	22/Oct/2014
Report period	016/Aug/2015 – 31/Aug/2015 (sixteen days)
K value - DPF upstream	1.24 [1/m]
K value – DPF downstream	0.00 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	Filter core was changed on 15/Feb/2015.
Dosing status	Dosing value was reduced by 70% on March February 15th. (Secondary value/Initial value=0.3)

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	46047 km
Bus mileage over the period	3092 km
Working days over the period	15 days
Stop days	1 day
Data logger working days	15 days
Working hours over the period	208 hours 15 minutes
Average working hours per day (including stop days)	13 hours 1 minutes
Bus average speed	14.85 km/hr
idle speed time to all working time ration	53.91 %
Total Bus fuel consumption over the period	2000 lit
Fuel consumption per hour	9.6 lit/hr
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	0.51 lit
Average additive consumption	164 cc/km
Additive consumption to fuel ration	255 cc per 1000 lit (continuous dosing)

Temperature, Pressure and Engine Speed Overview

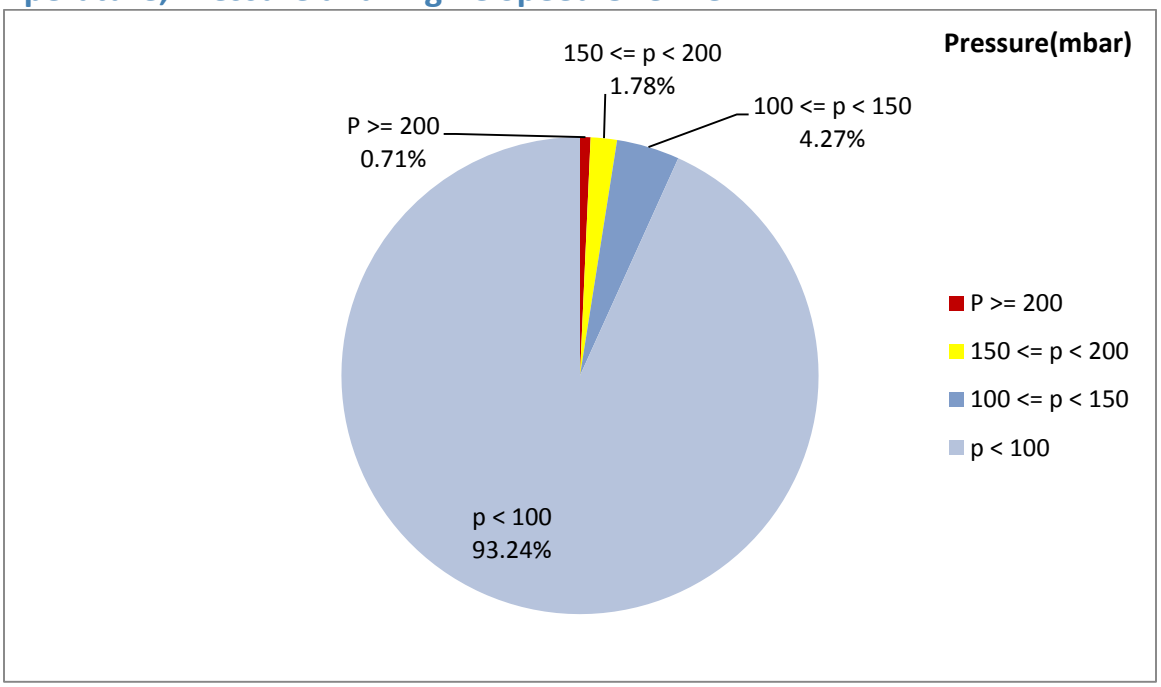


Figure 1- Pressure distribution over the working hours

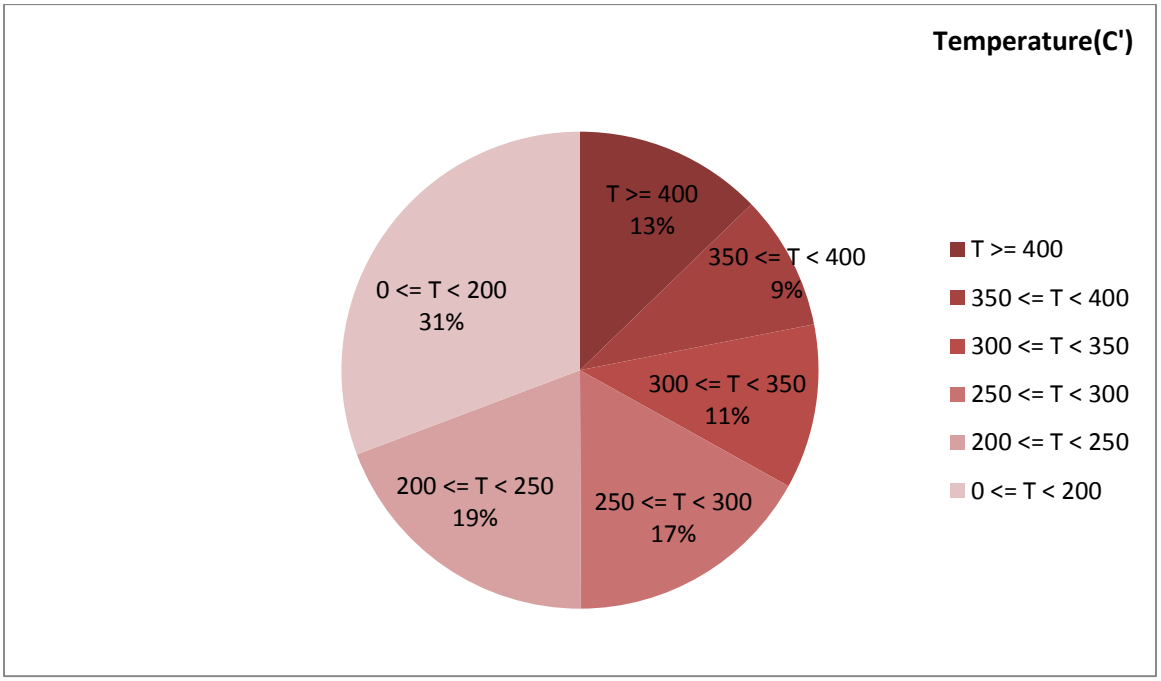


Figure 2-Temperature distribution over the working hours

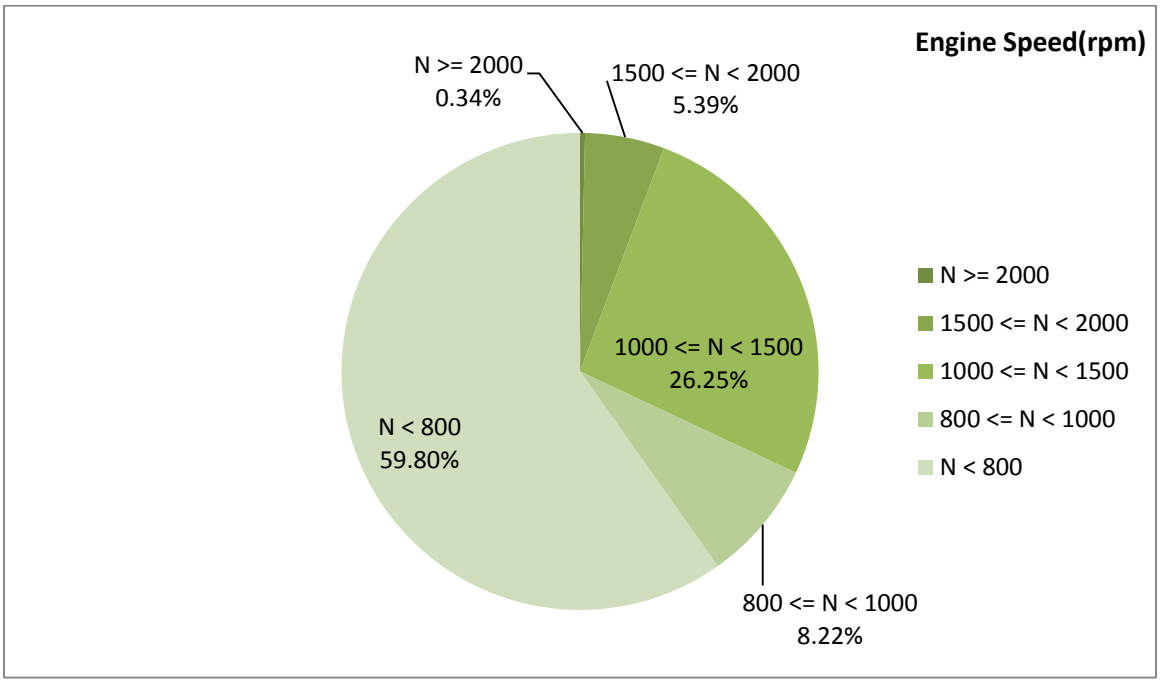


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
269.42	30.16	825

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
323.75	54.07	1146

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
574-50	285-0	2352-512

Detailed Pressure Analysis

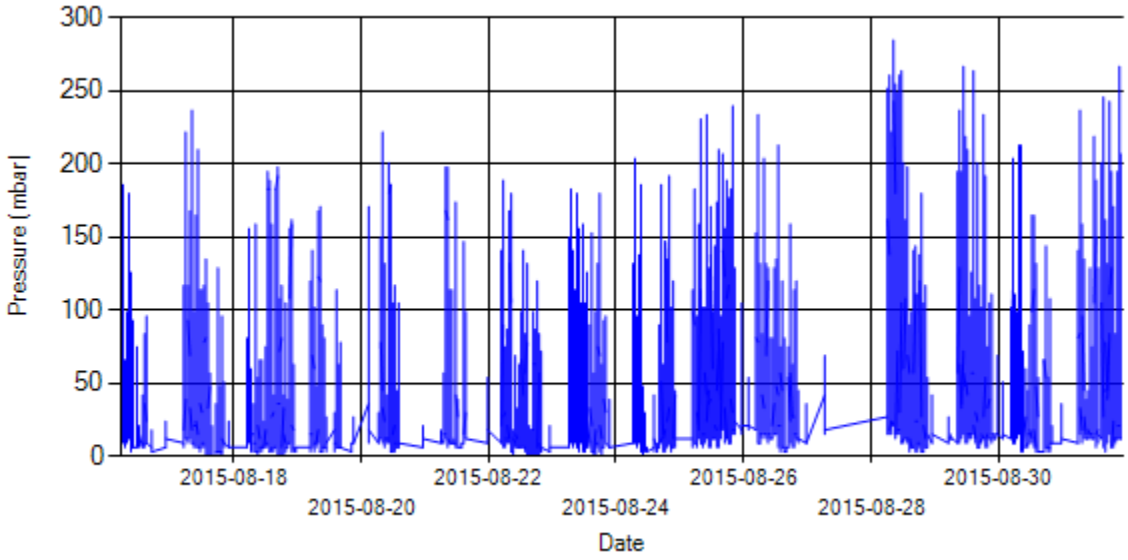


Figure 4- Pressure distribution over the period

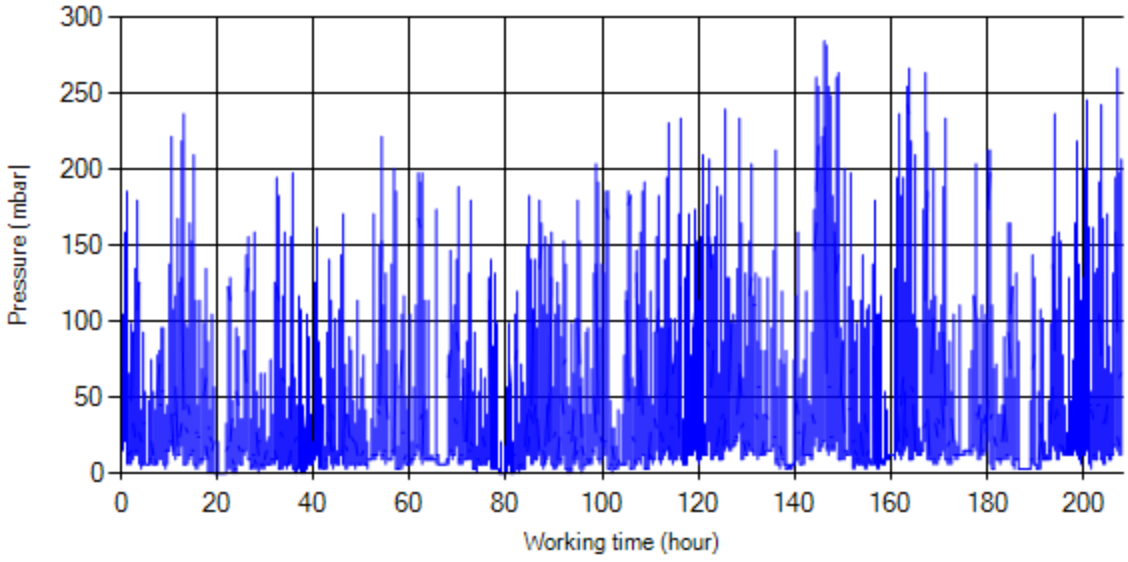


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

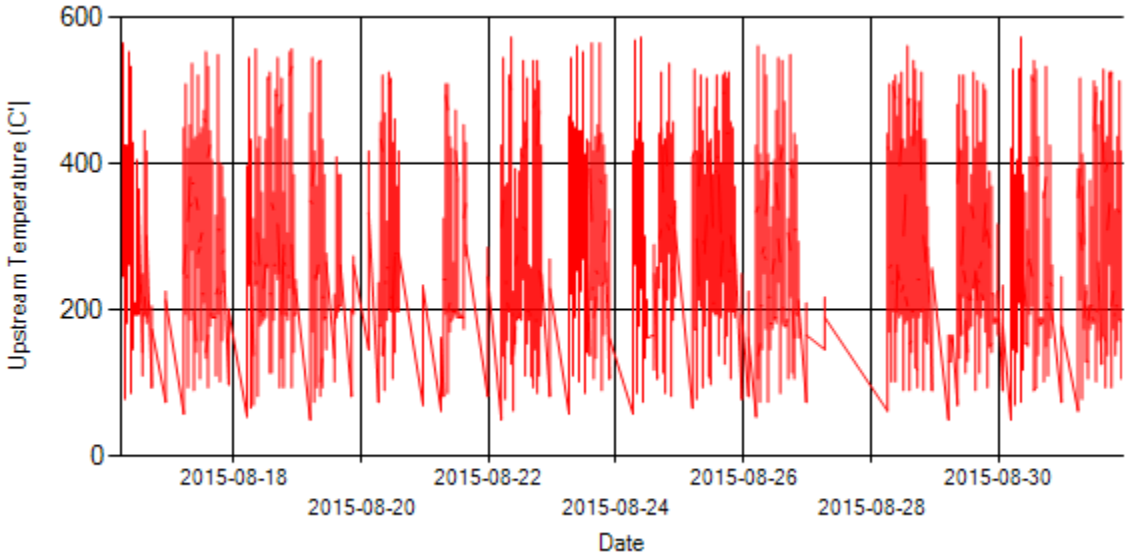


Figure 6- Temperature distribution over the period

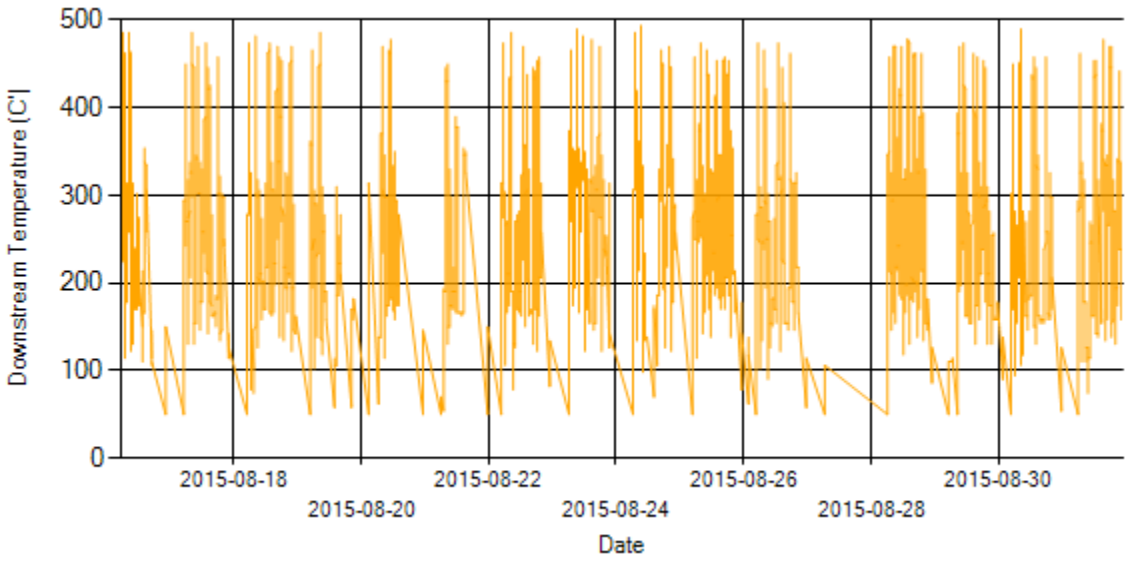


Figure 7- Temperature distribution over the period

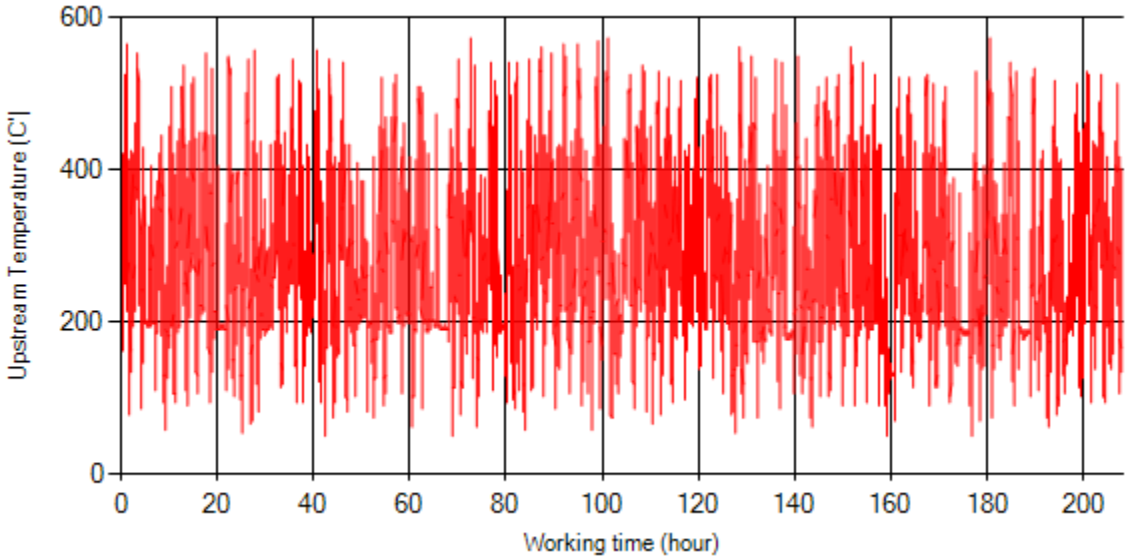


Figure 8- Temperature vs. working hours

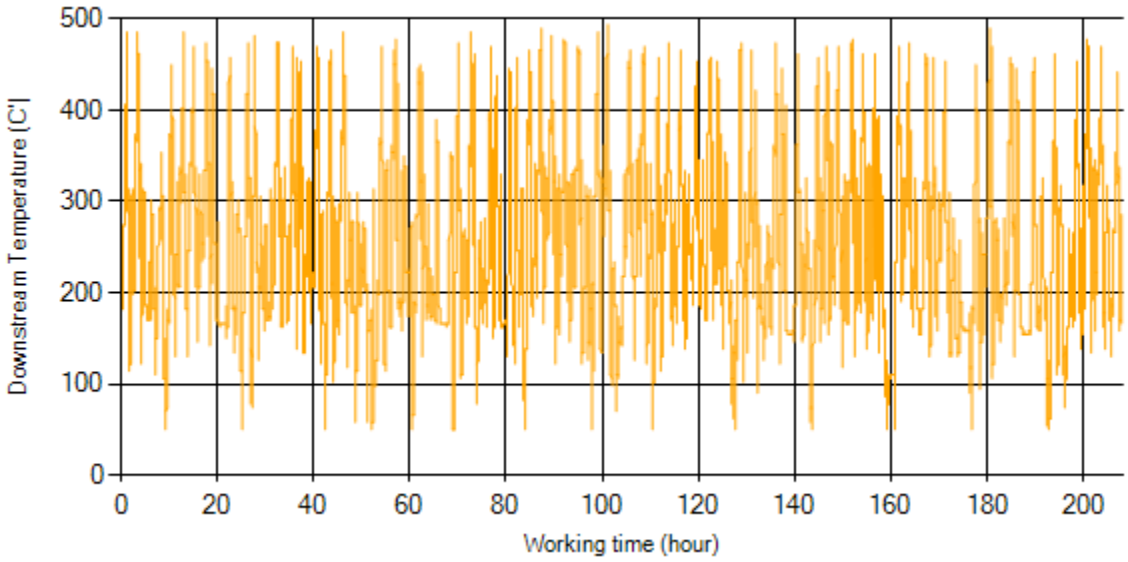


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

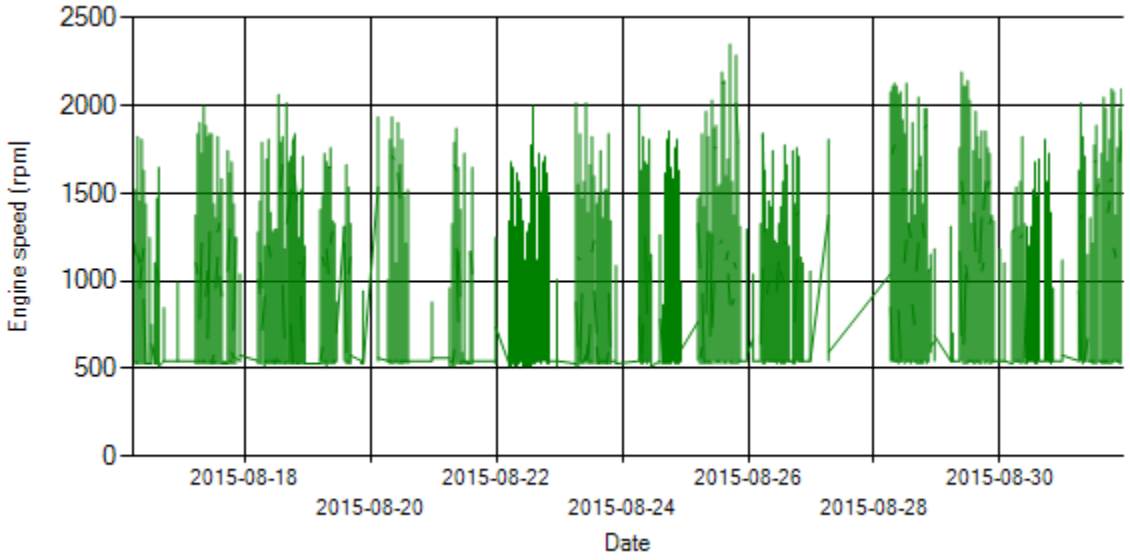


Figure 10- Engine speed distribution over the period

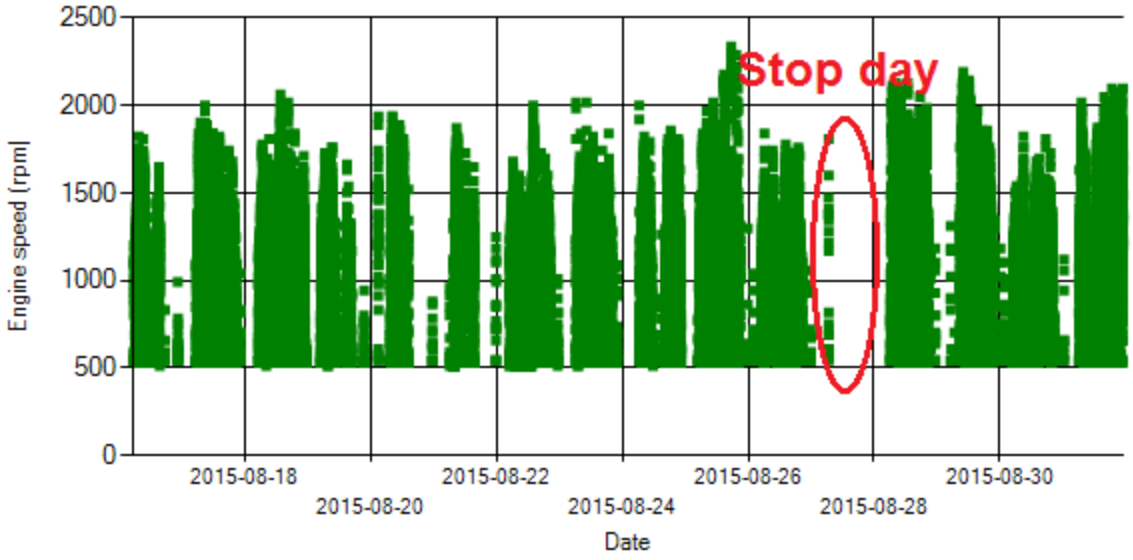


Figure 11- Engine speed diagram for calculating CPK's working days

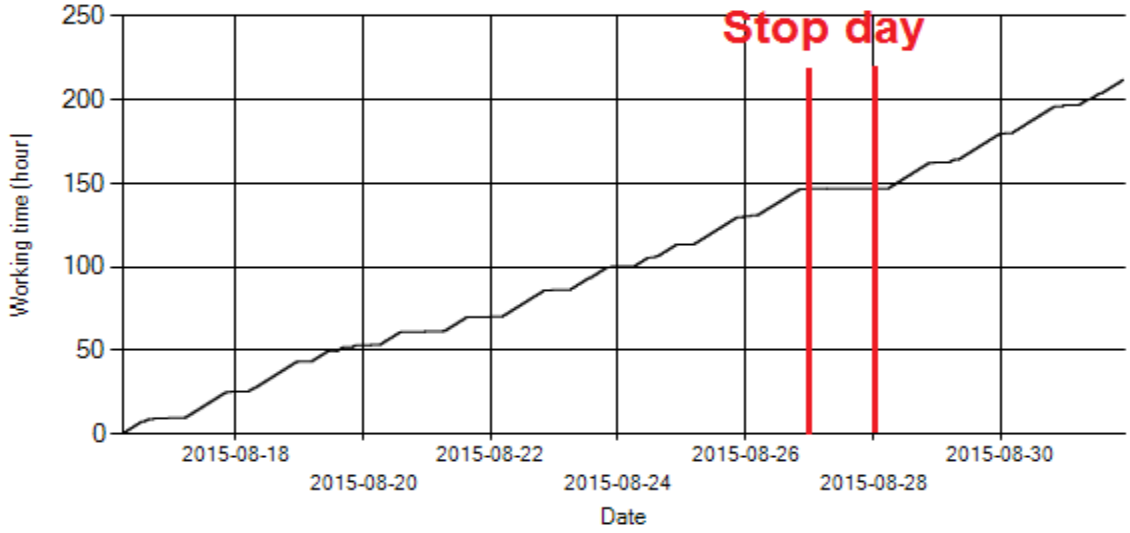


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, Aug 27th was stop day.

Pressure-Engine Speed diagrams

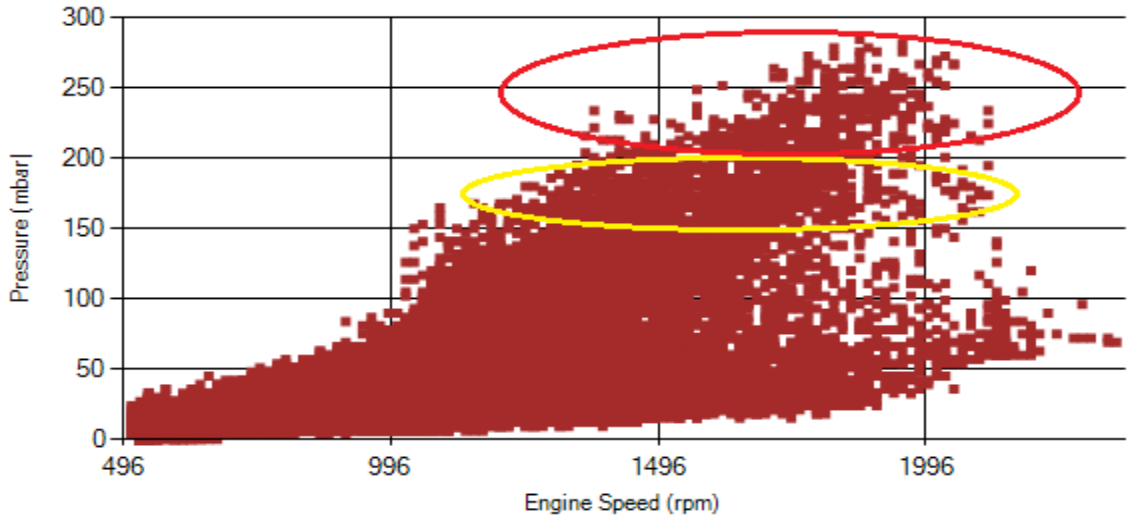


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

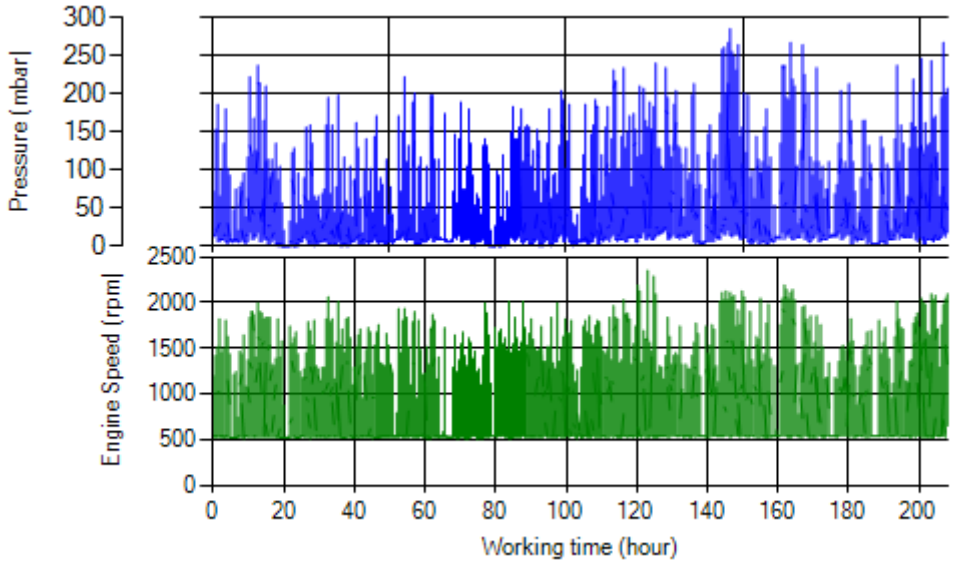


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

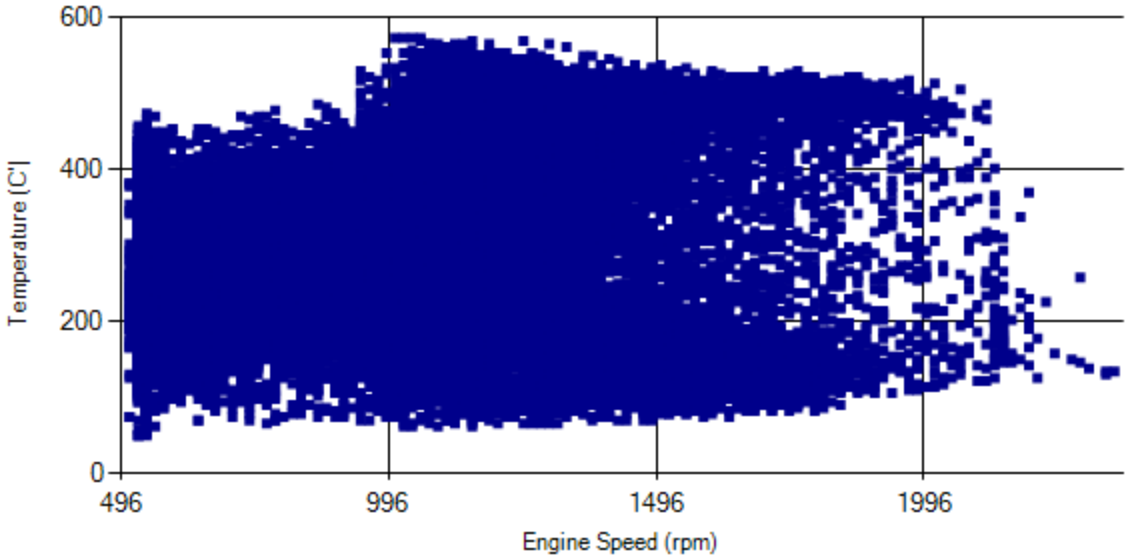


Figure 15- Temperature against engine speed

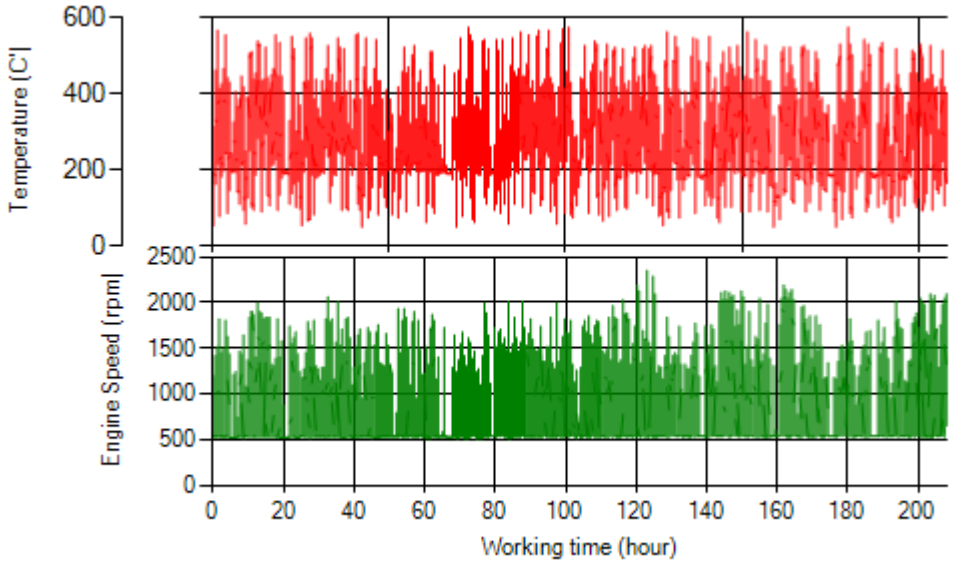


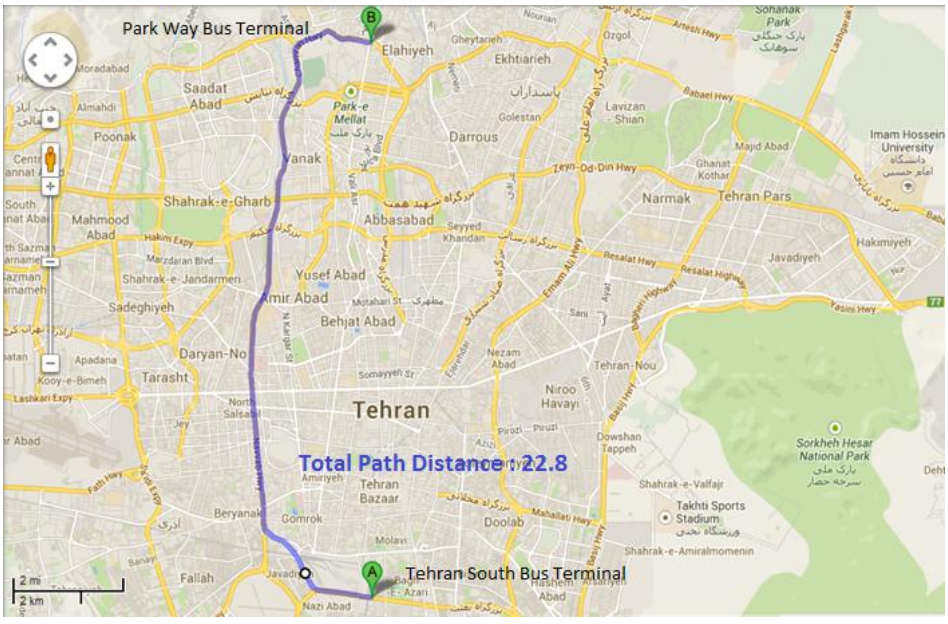
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.71% of working time pressure was above 200 mbar and only 2.49% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 13% of total working time, temperature is above 400 ℃ and 22% above 350℃.

Filter operation status	Excellent ☐	Good ■
	Maintenance required ☐	Failed☐

Vehicle plate number	78524
Bus line	Number 4 (south to north Bus line)
DPF producer company	PURItech (Passive system with FBC)



Overall Information

Table1- Overall Information

Vehicle plate number	78524
CPK data logger number	LN: 001443, DN: 1930,Sim +989218786219
Bus line	Number 4 (south to north Bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	PURItech (Passive system with FBC)
Installation date	28/Jan/2015
Report period	01/Aug/2015 – 15/Aug/2015 (fifteen days)
K value – DPF upstream	1.80 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF core was removed on Jul 22nd and was cleaned on Aug 12th.*
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	28753 km
Bus mileage over the period	2724 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	157 hours 28 minutes
Average working hours per day (including stop days)	10 hours 30 minutes
Bus average speed	17.3 km/hr
Idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1740 lit
Fuel consumption per hour	11.05 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	-
Average additive consumption	-
Additive consumption to fuel ration	-

Notice: Due to some technical problem related to data logger, rpm data missed and engine speed related information are blank. DPF was installed on bus on Aug 12th and was working only for three days during this period. So additive consumption measurement was really hard and unreliable.

Temperature, Pressure and Engine Speed Overview

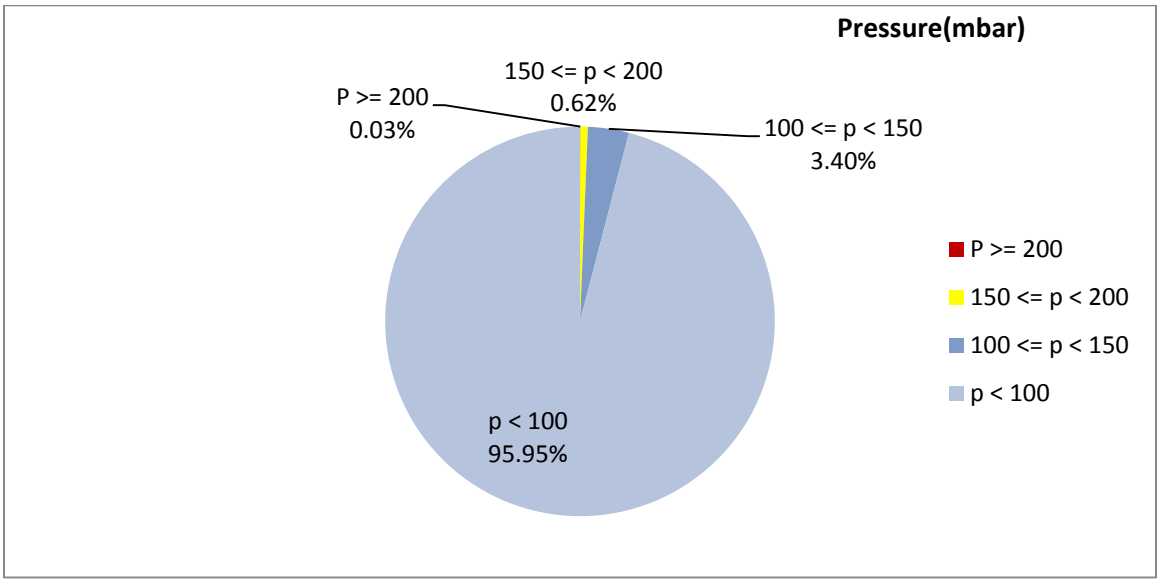


Figure 1- Pressure distribution over the working hours

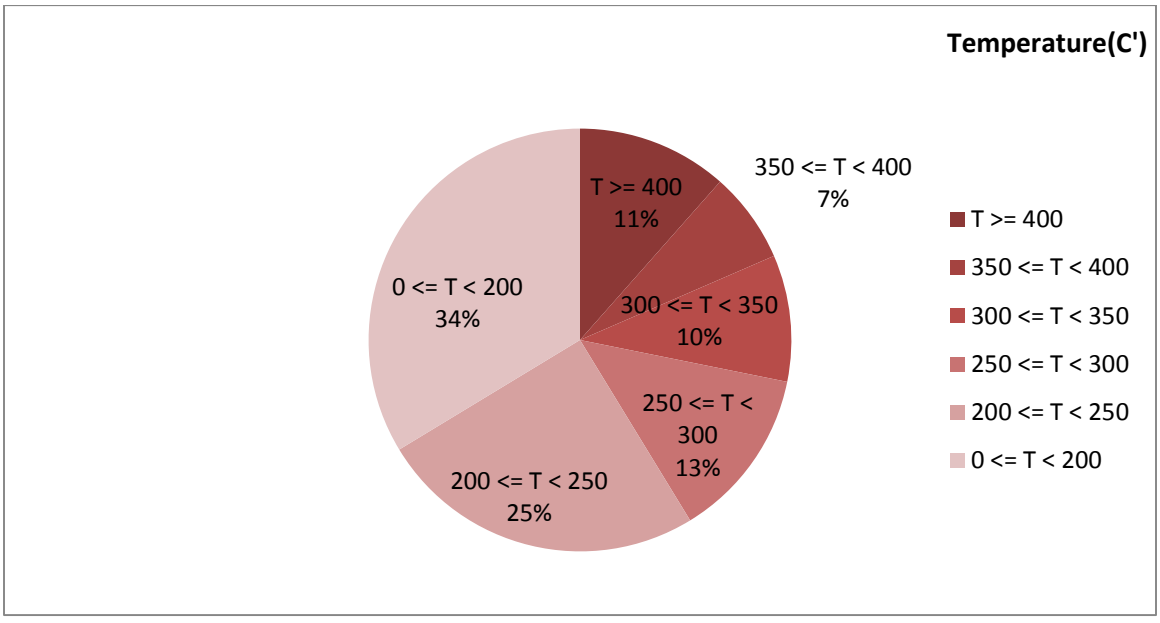


Figure 2-Temperature distribution over the working hours

Notice: Figure 1 and 2 data belong to DPF existence period (Aug 12th, 13th, 14th).

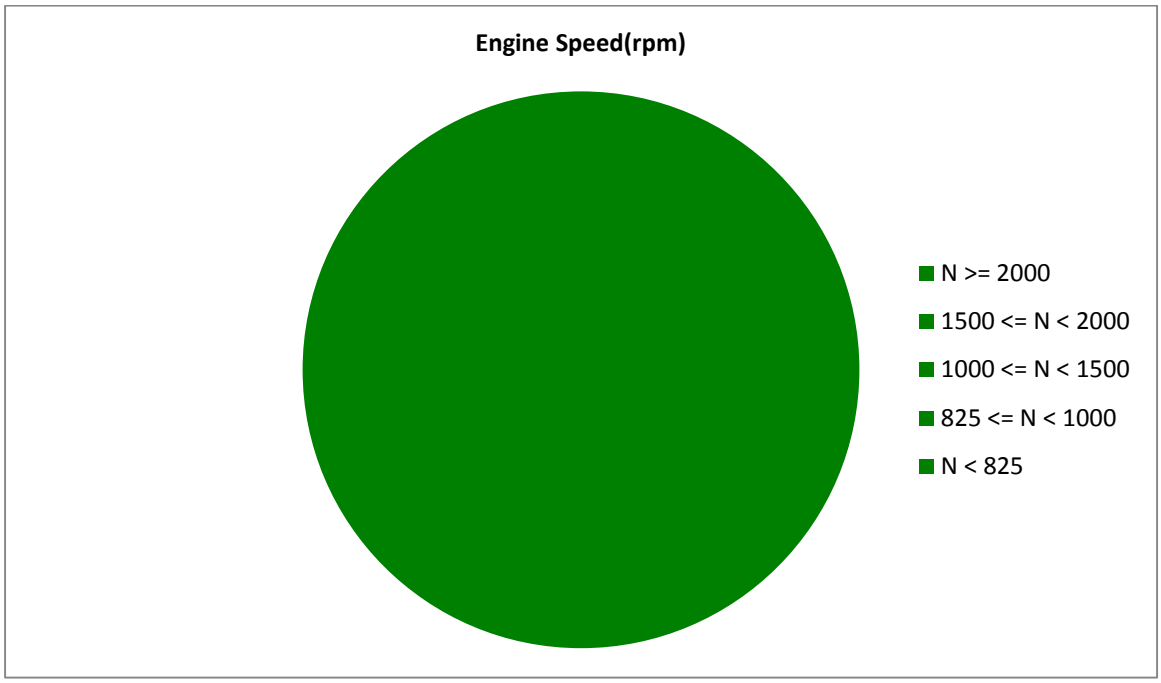


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
274.31	9.11	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
-	-	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
606-50	204-0	-

Notice: Due to technical problem, rpm sensor data missed. So parameters like idling speed was left blank.

Notice: Low pressure values were because of muffler existence from Aug 1st to 12th.

Detailed Pressure Analysis

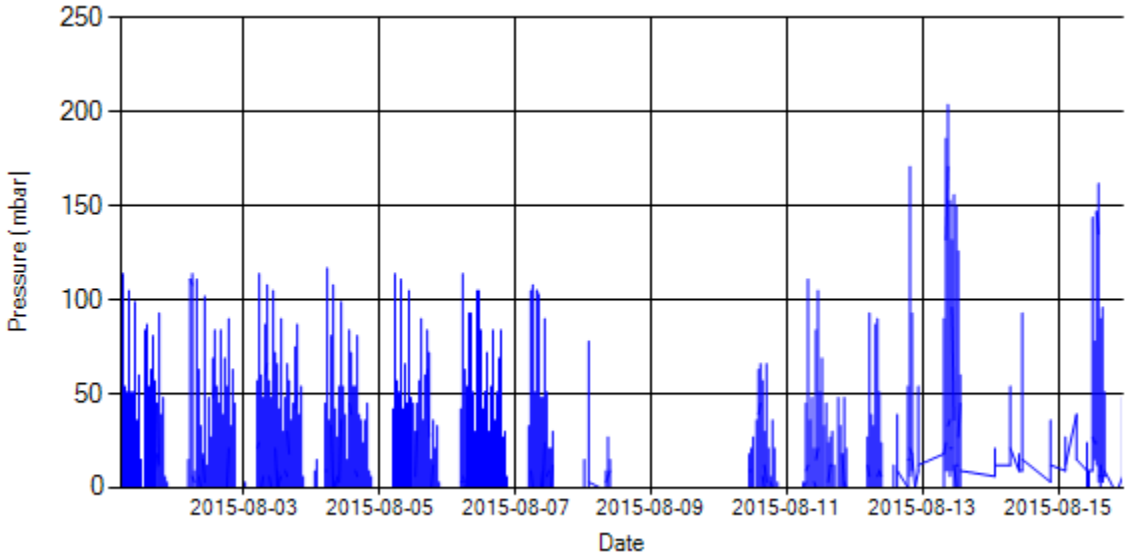


Figure 4- Pressure distribution over the period

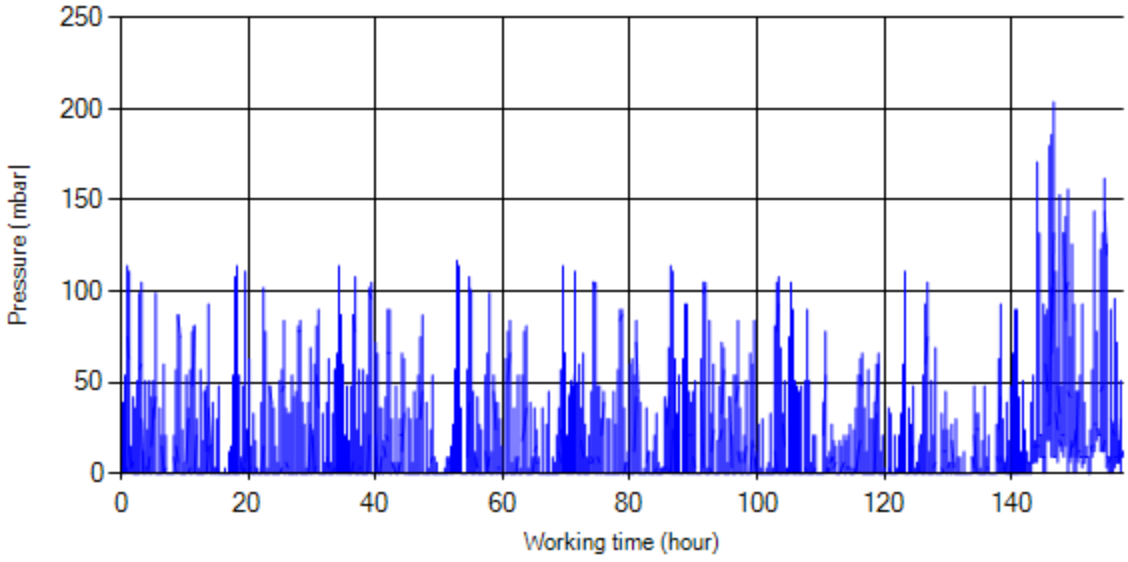


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

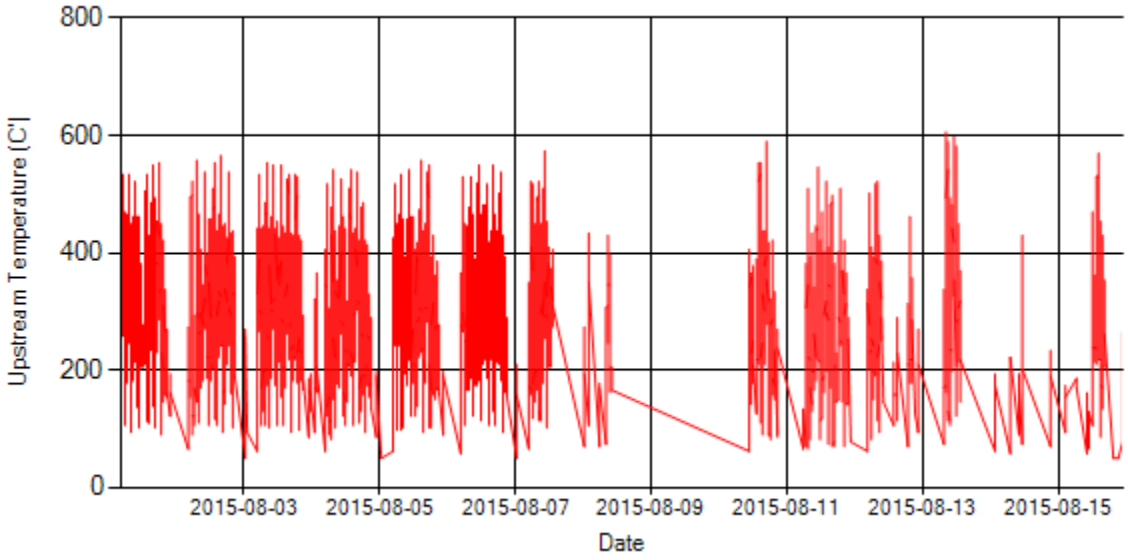


Figure 6- Temperature distribution over the period

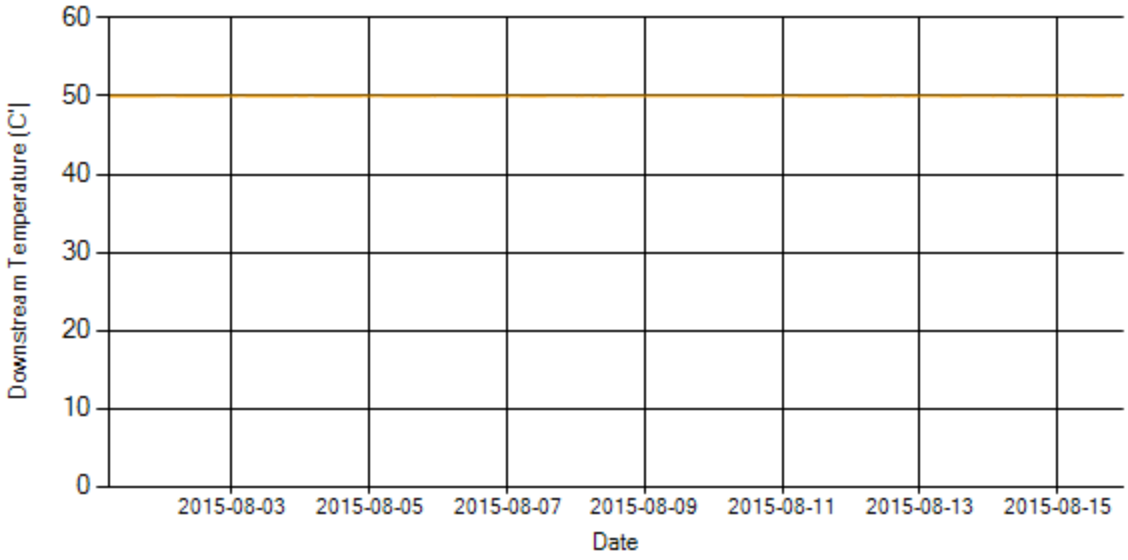


Figure 7- Temperature distribution over the period

Notice: Temperature 2 sensor had problem during this period and showed constant 50 values.

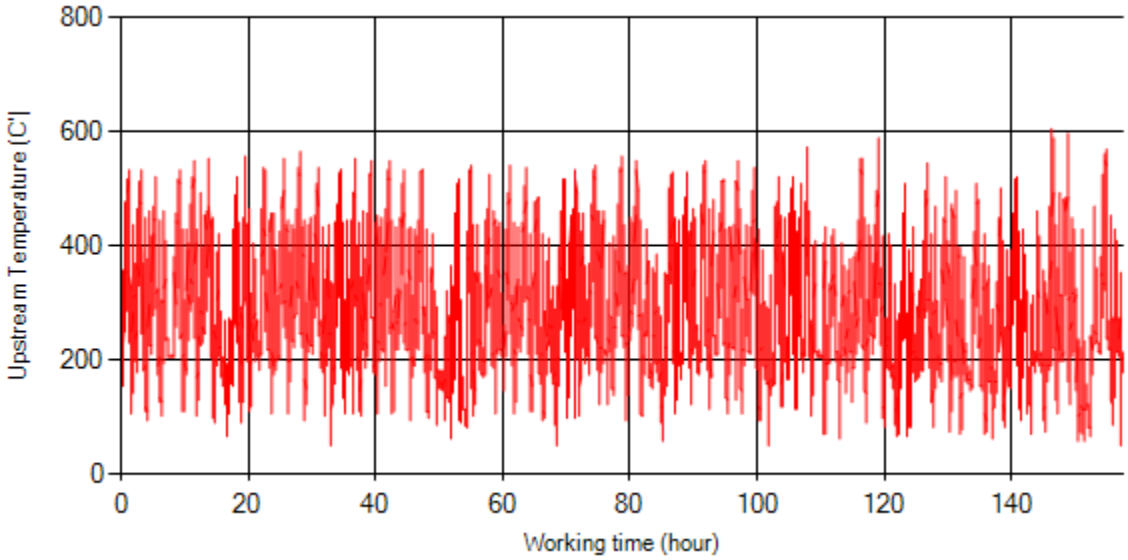


Figure 8- Temperature vs. working hours

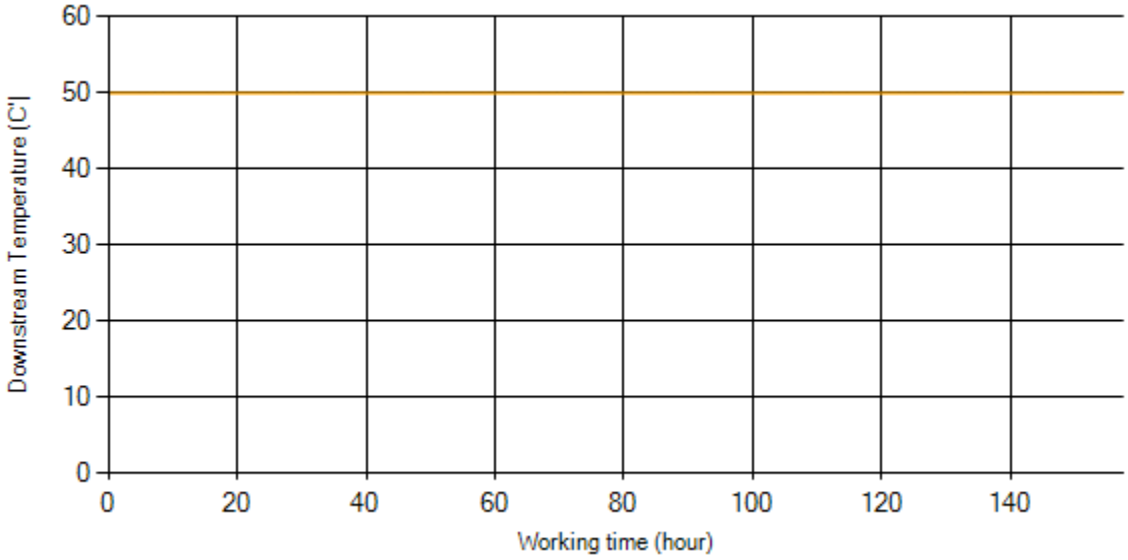


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

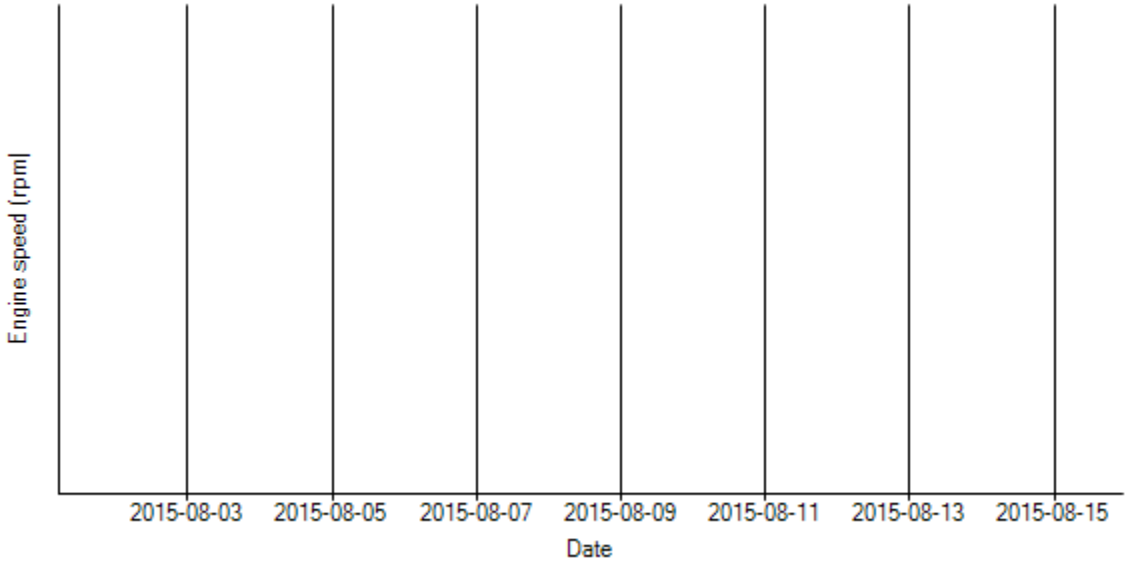


Figure 10- Engine speed distribution over the period

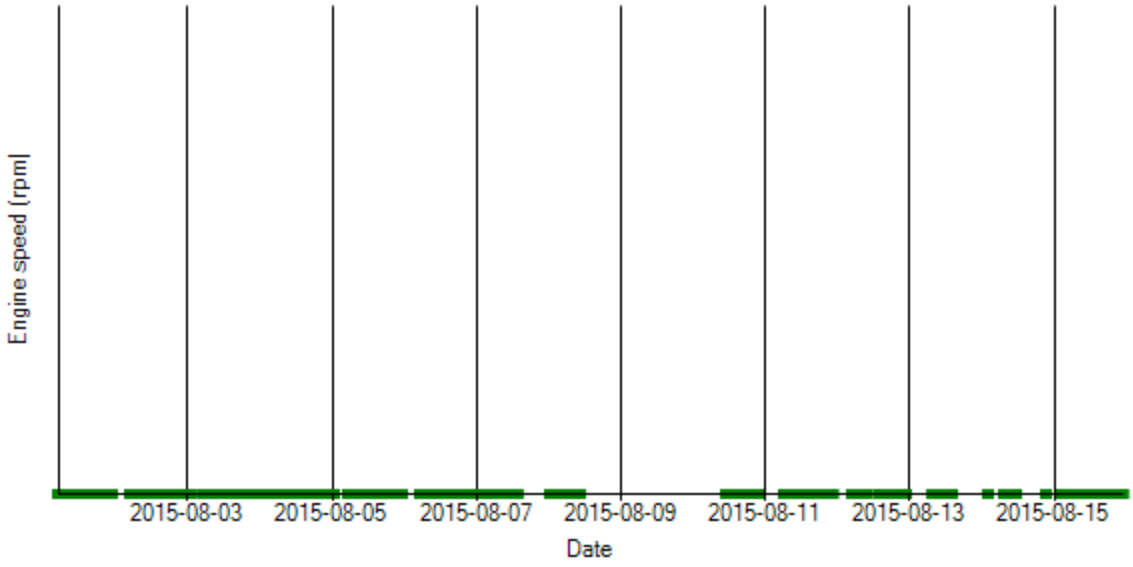


Figure 11- Engine speed diagram for calculating CPK's working days

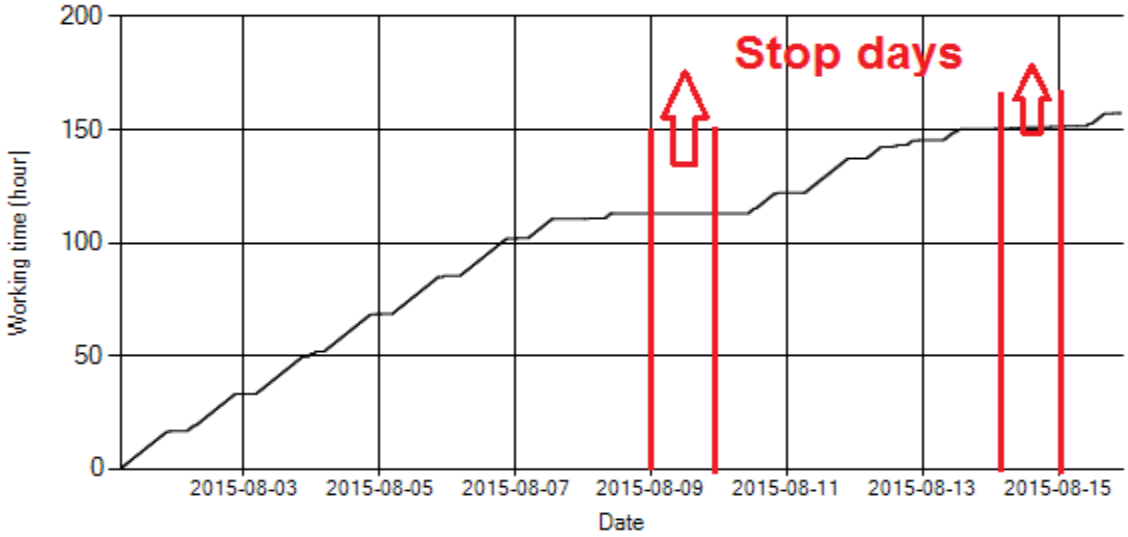


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, Aug 9th and 14th were stop days.

Pressure-Engine Speed diagrams

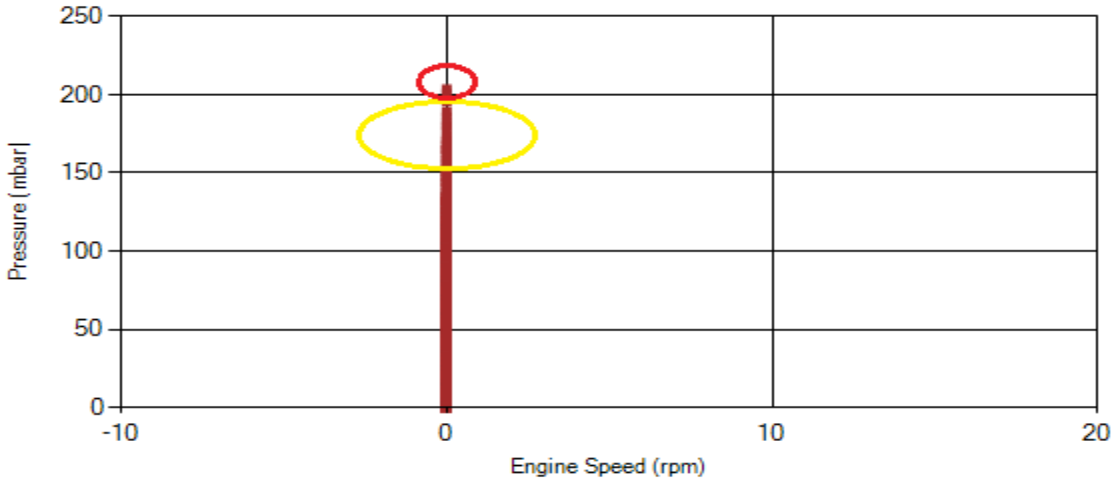


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

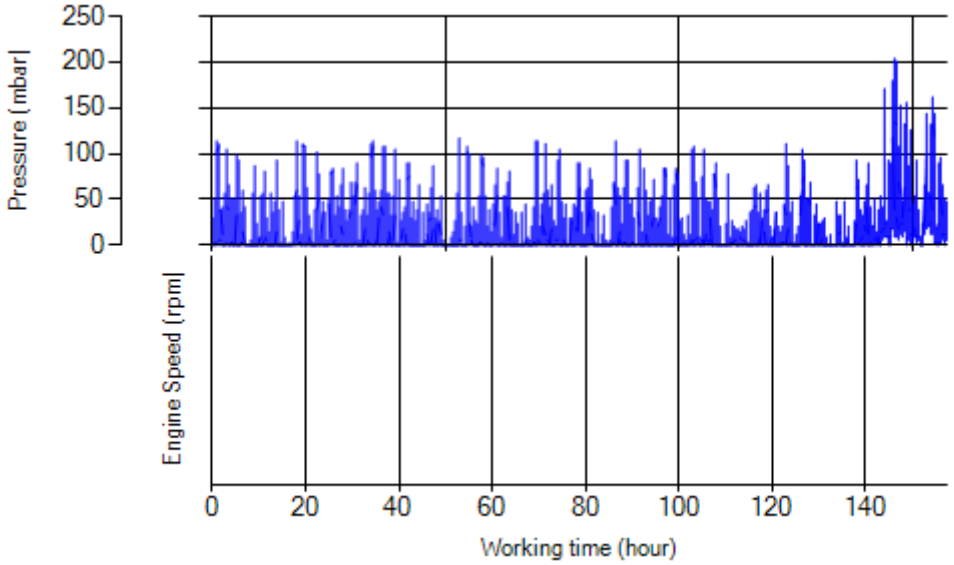


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

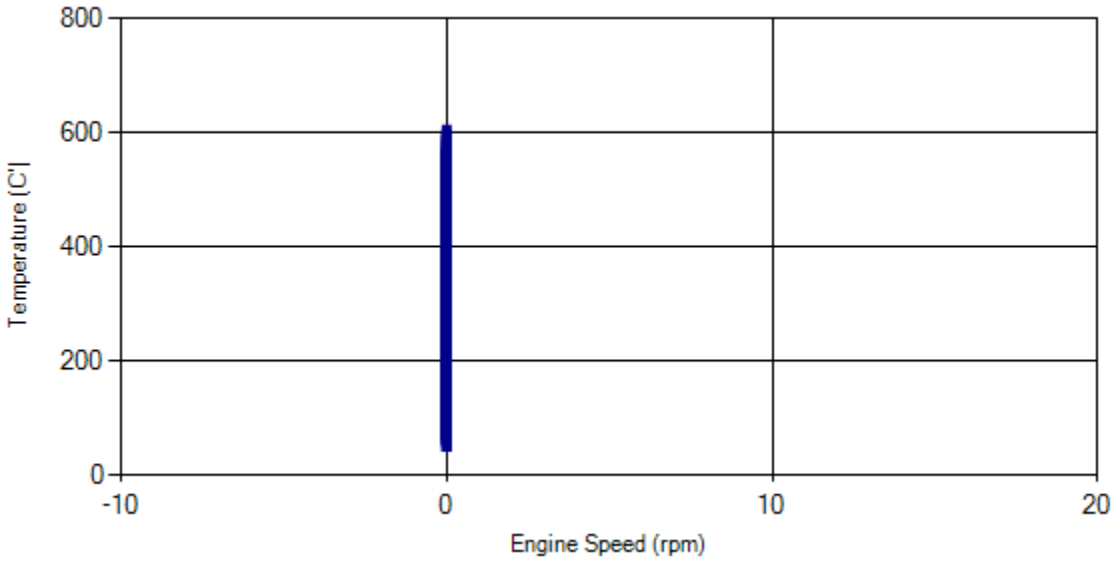


Figure 15- Temperature against engine speed

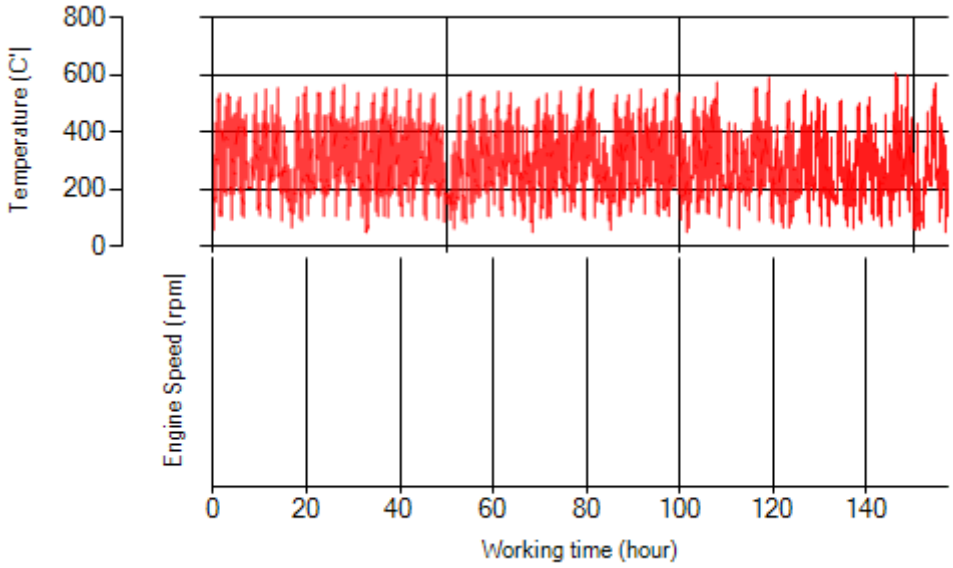


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

Considering data logger data after filter installation:

- As depicted in figure 1, only 0.03% of total working time pressure is above 200 mbar and 0.65% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 11% of total working time temperature is above 400 ℃ and 18% above 350℃.

Filter operation status	Excellent ■	Good ☐
	Maintenance required ☐	Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	78524
CPK data logger number	LN: 001443, DN: 1930, Sim +989218786219
Bus line	Number 4 (south to north Bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	PURItech (Passive system with FBC)
Installation date	28/Jan/2015
Report period	16/Aug/2015 – 31/Aug/2015 (sixteen days)
K value – DPF upstream	1.80 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF core was removed on Jul 22nd and was cleaned on Aug 12th.*
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	31427 km
Bus mileage over the period	2674 km
Working days over the period	14 days
Stop days	2 days
Data logger working days	14 days
Working hours over the period	185 hours 49 minutes
Average working hours per day (including stop days)	11 hours 36 minutes
Bus average speed	14.39 km/hr
Idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1742 lit
Fuel consumption per hour	9.37 lit/hr
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	-
Average additive consumption	-
Additive consumption to fuel ration	-

Notice: Due to some technical problem related to data logger, rpm data missed. So parameters like idling speed was left blank.
Notice: Because of additive hose problem, system didn't get enough additive during this period. Also additive consumption value in DPF during this period is unavailable.

Temperature, Pressure and Engine Speed Overview

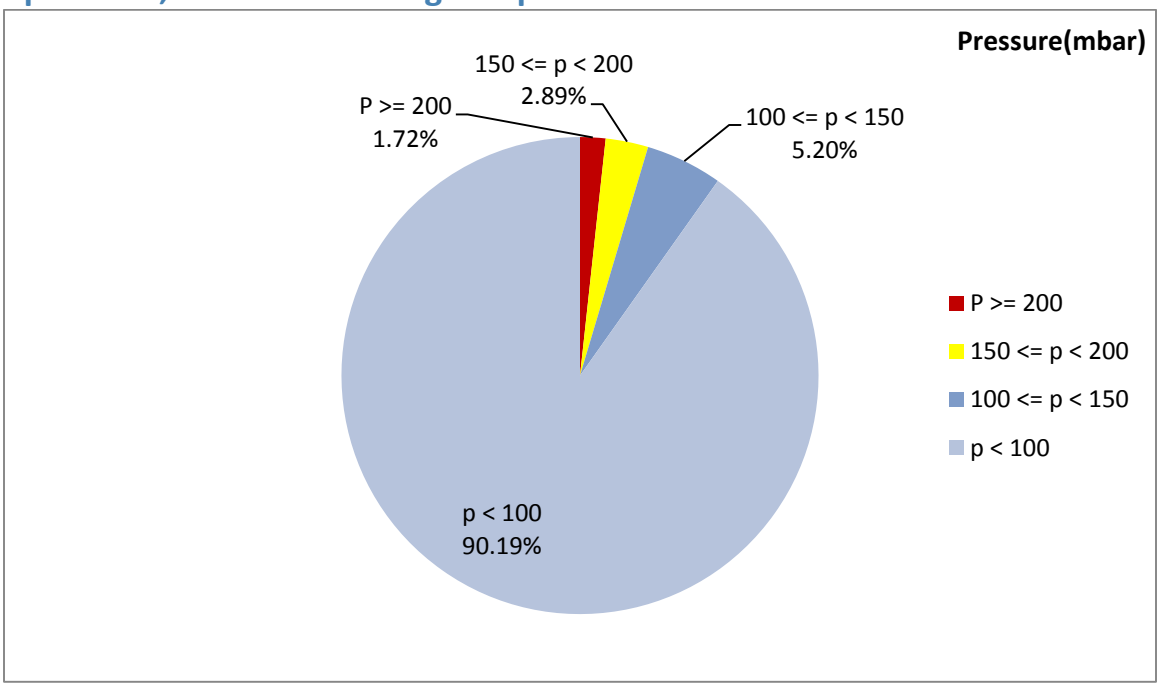


Figure 1- Pressure distribution over the working hours

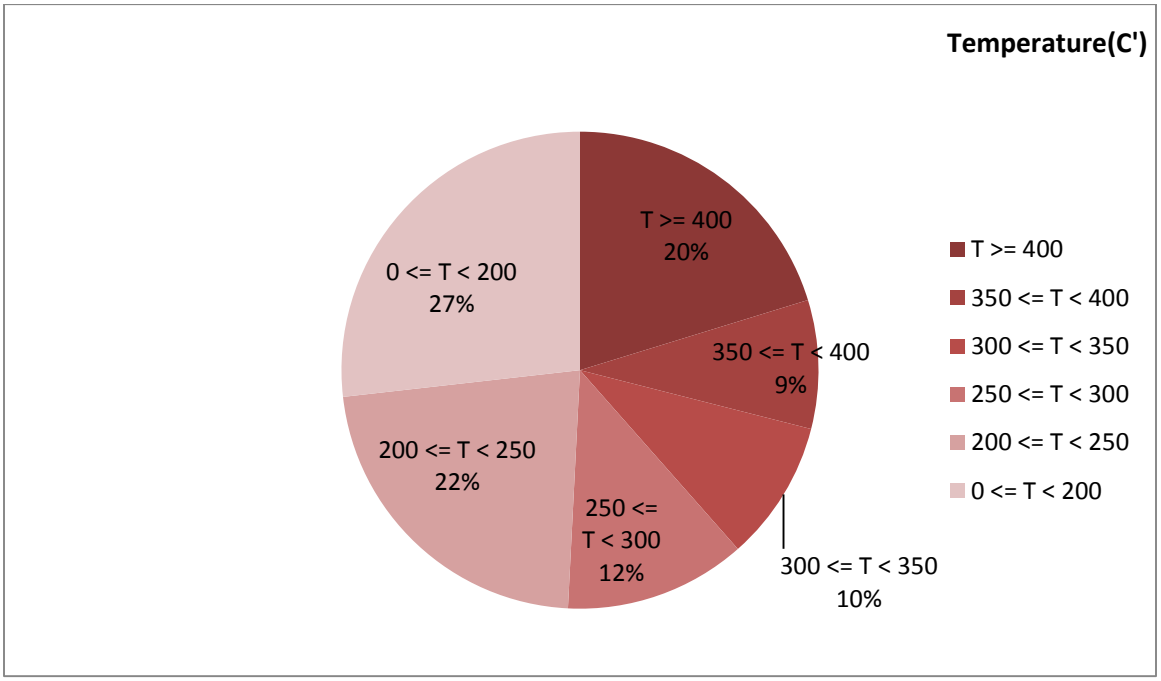


Figure 2-Temperature distribution over the working hours

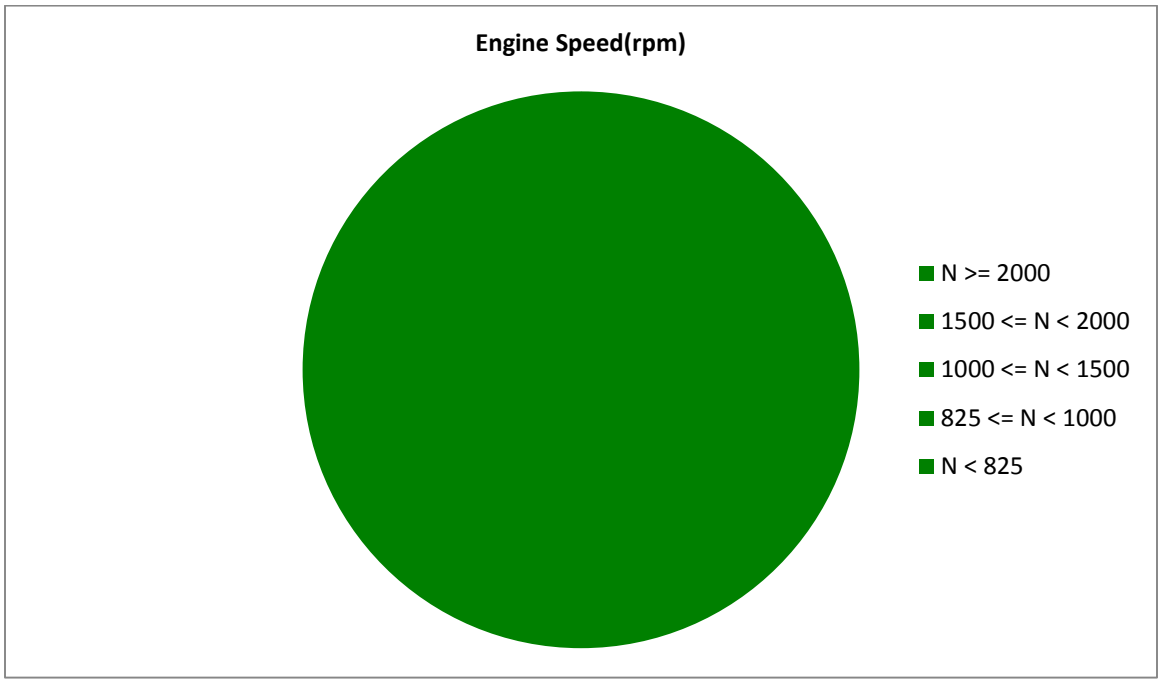


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
288.78	38.23	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
288.78	38.23	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
726-50	354-0	-

Notice: Due to technical problem, rpm sensor data missed. So parameters like idling speed was left blank.

Detailed Pressure Analysis

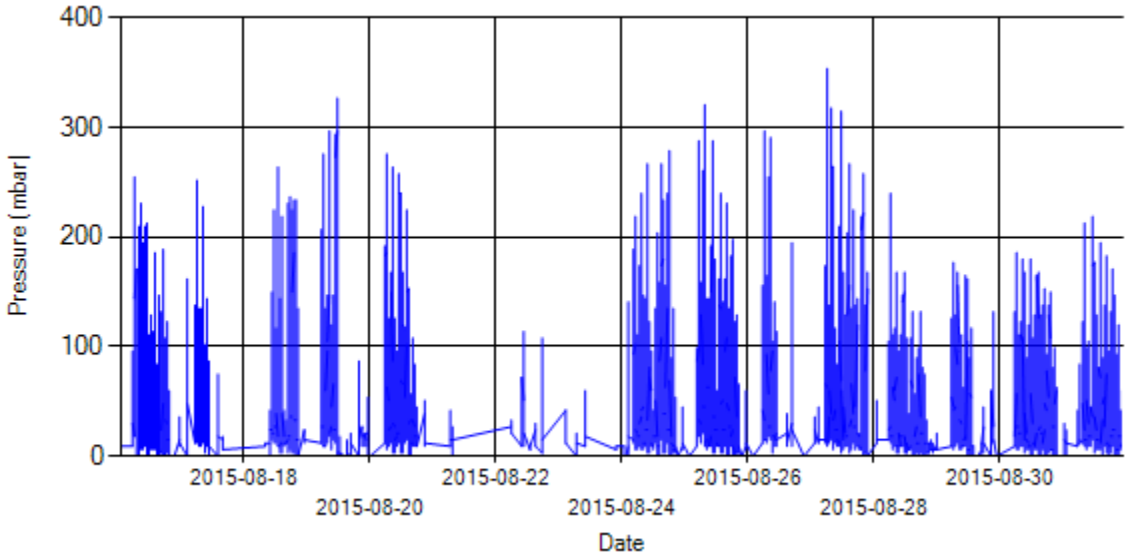


Figure 4- Pressure distribution over the period

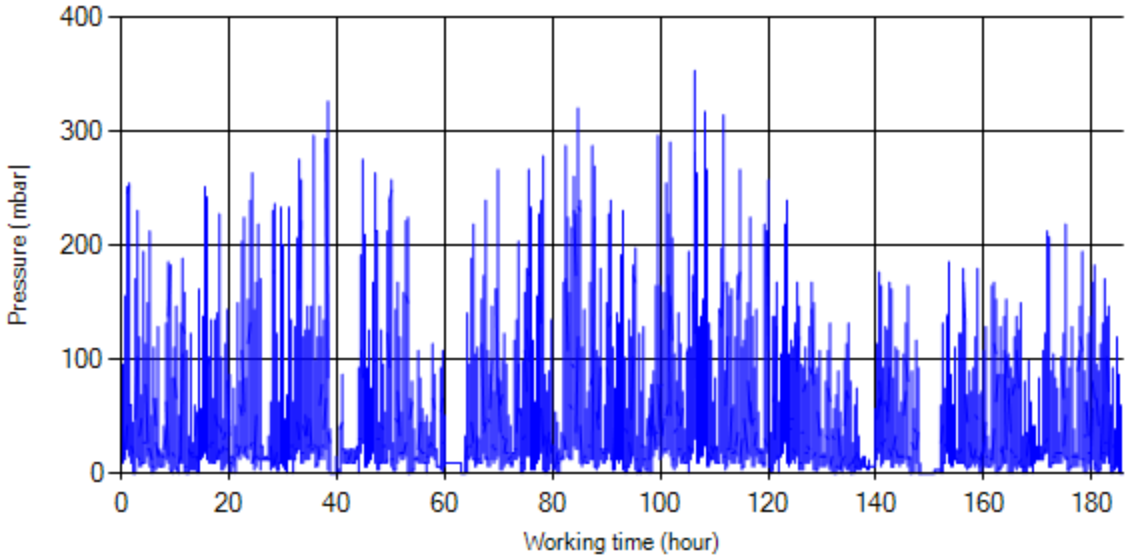


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

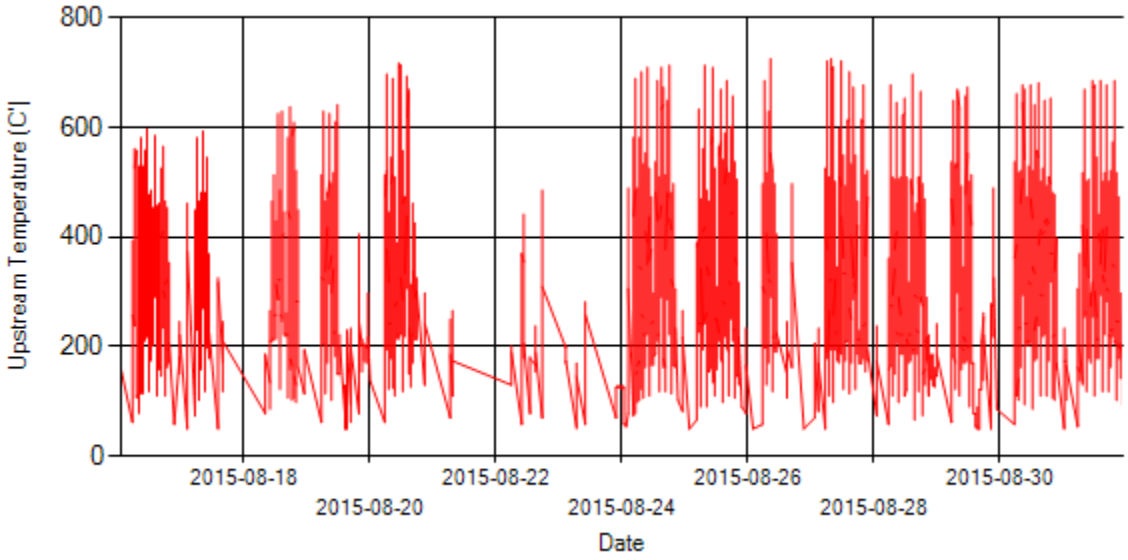


Figure 6- Temperature distribution over the period

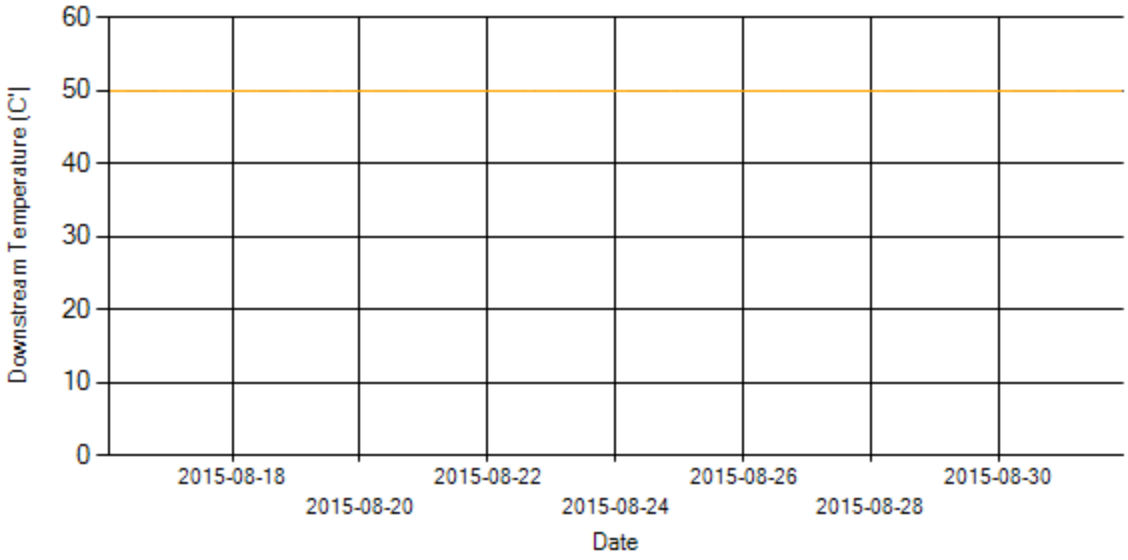


Figure 7- Temperature distribution over the period

Notice: Temperature 2 sensor had problem during this period and showed constant 50 values.

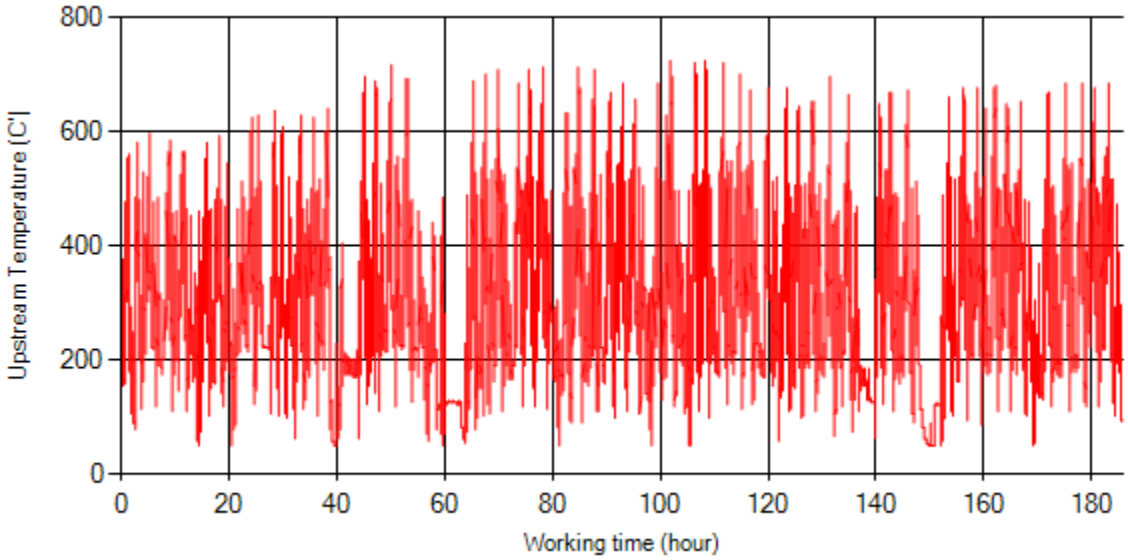


Figure 8- Temperature vs. working hours

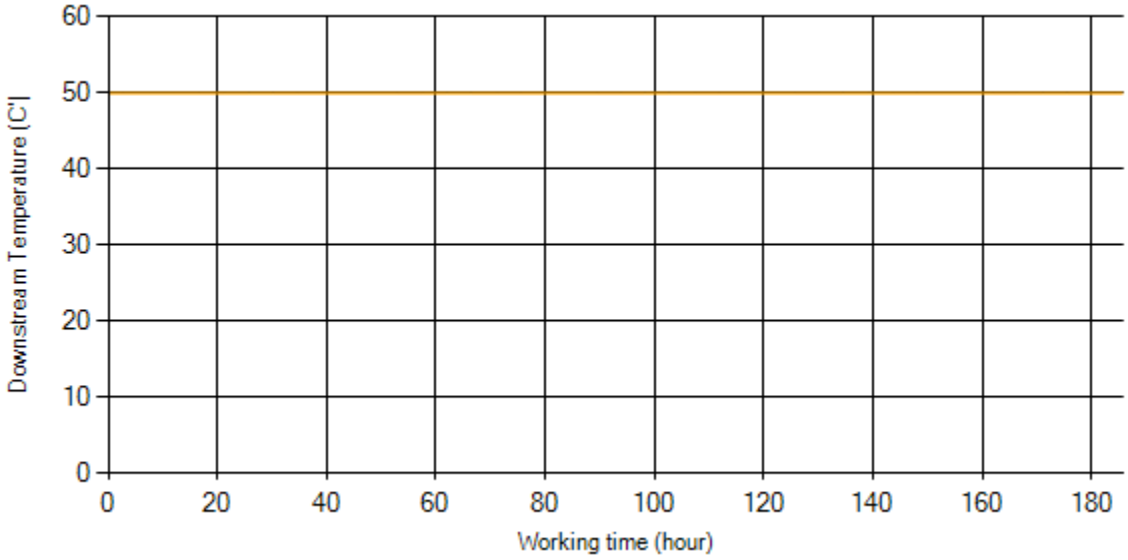


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

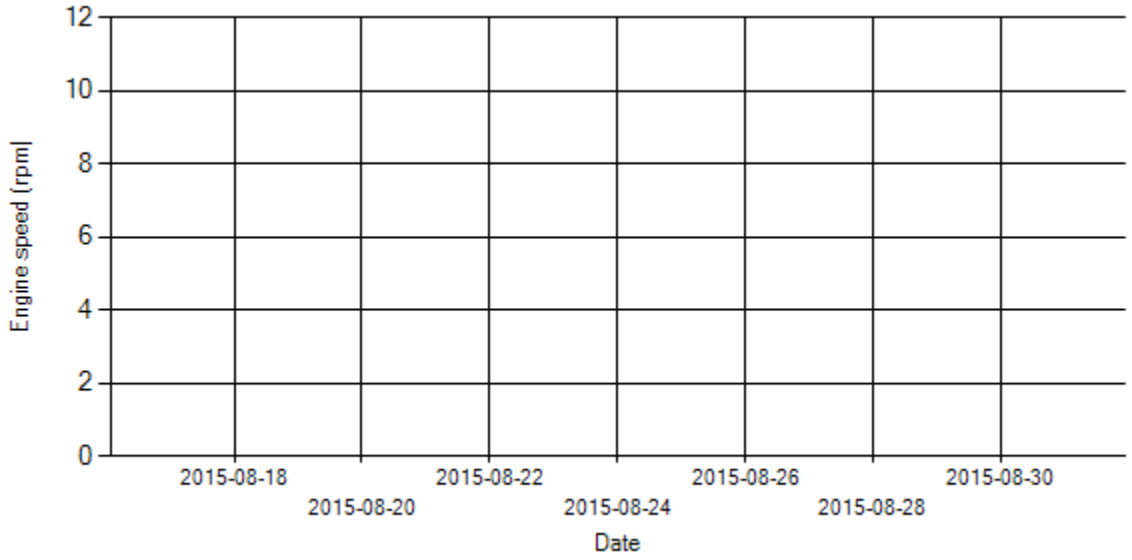


Figure 10- Engine speed distribution over the period

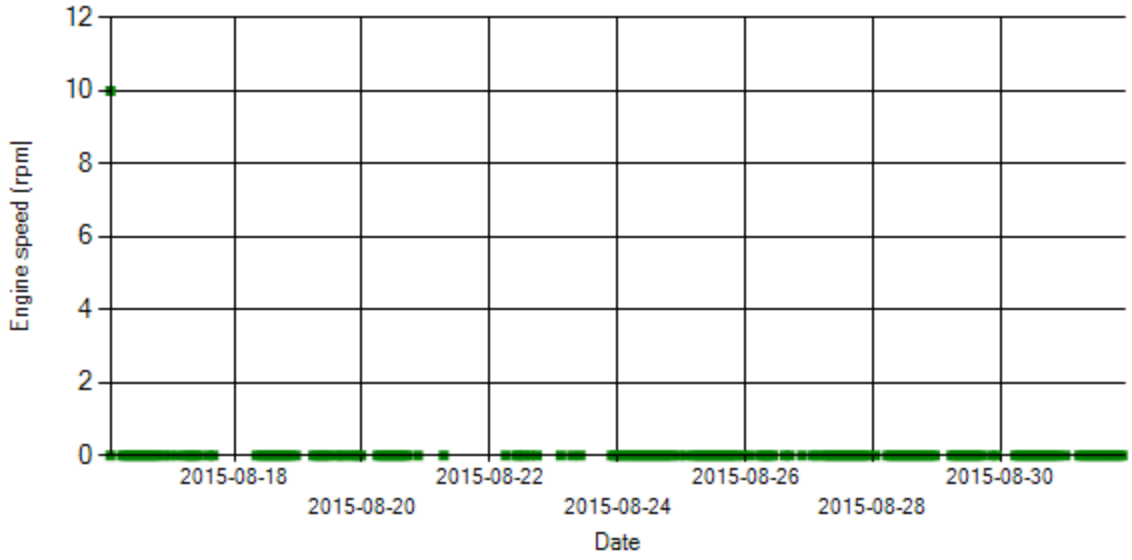


Figure 11- Engine speed diagram for calculating CPK's working days

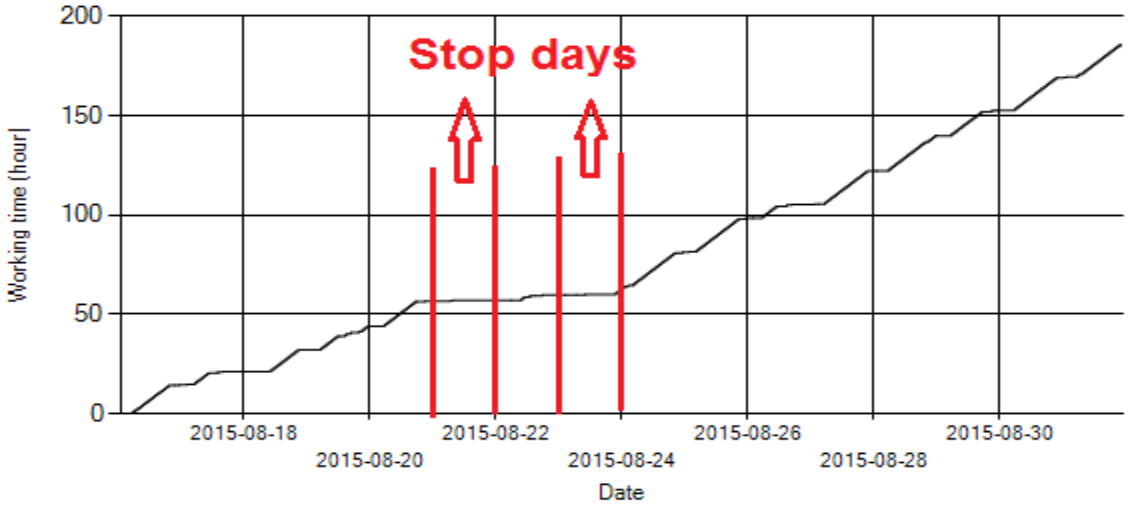


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, Aug 21st and 23rd were stop days.

Pressure-Engine Speed diagrams

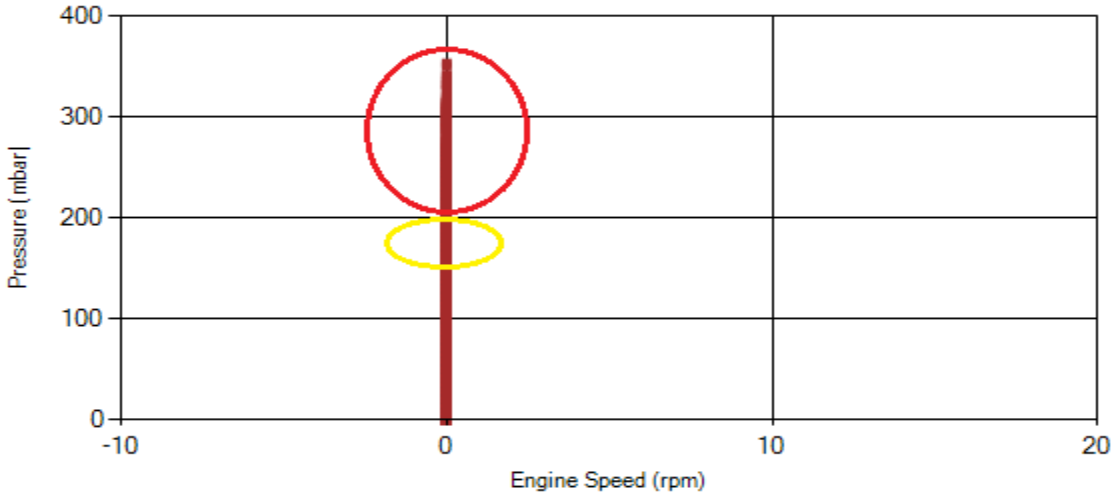


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

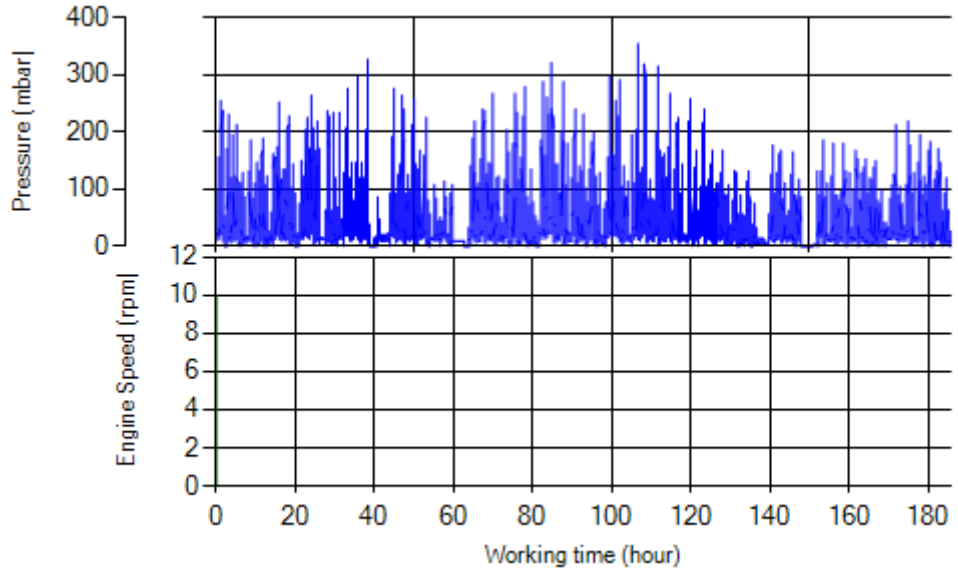


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

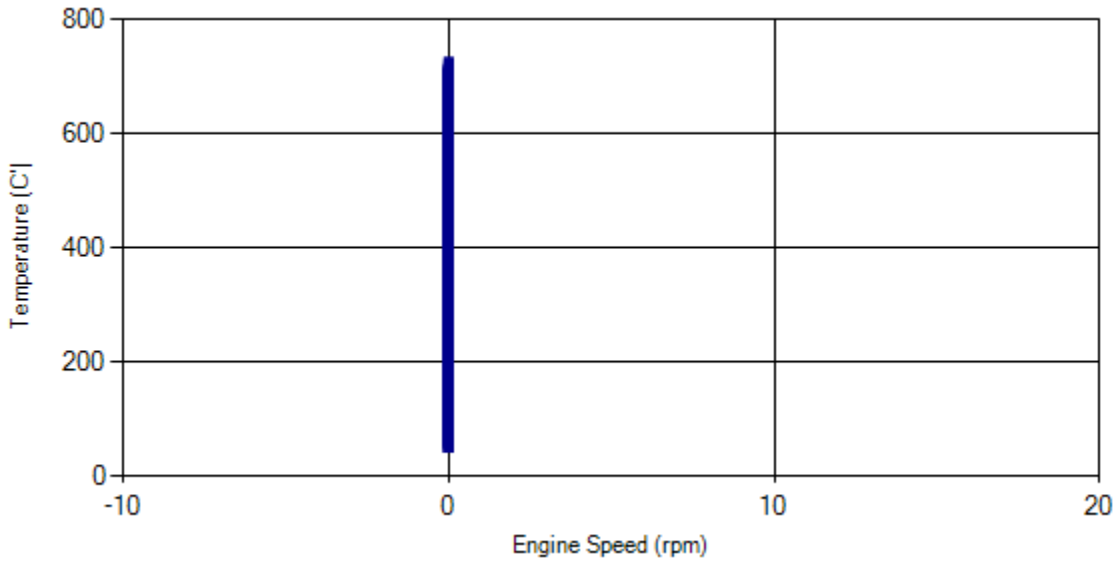


Figure 15- Temperature against engine speed

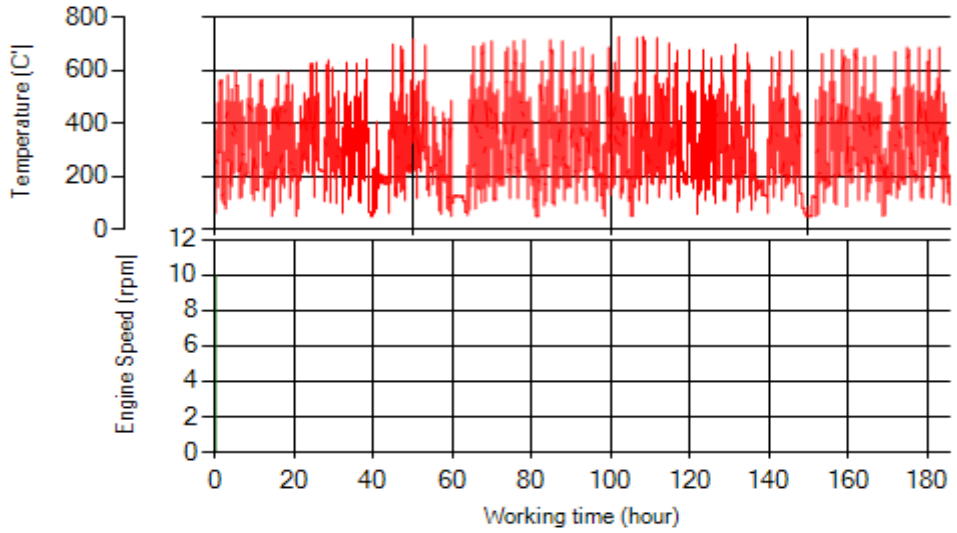
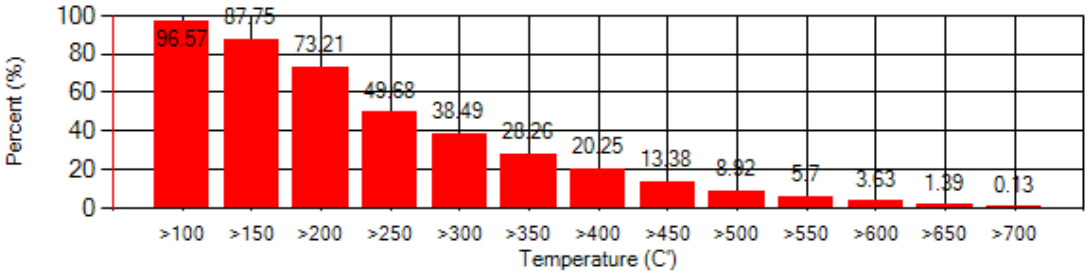


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

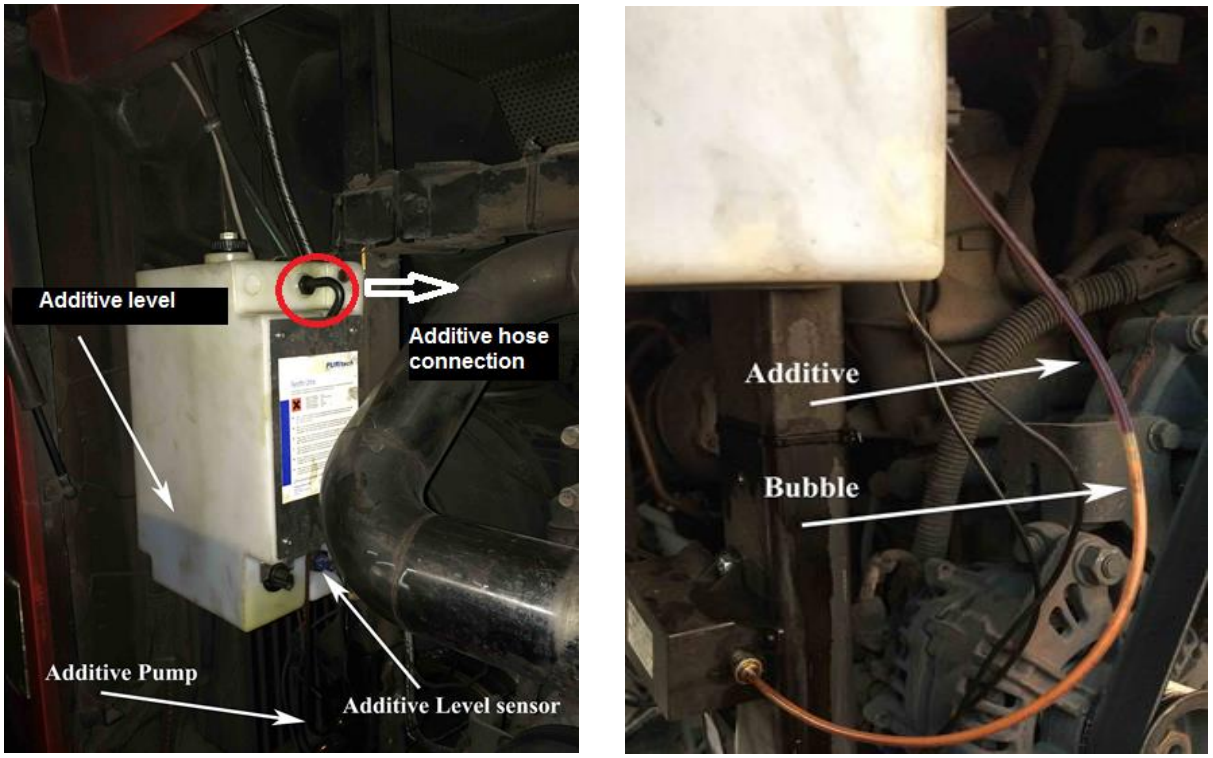
- As depicted in figure 1, 1.72% of total working time pressure is above 200 mbar and 4.61% above 150mbar. Additive system defect was the reason of back pressure rise.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 20% of total working time temperature is above 400 ℃ and 29% above 350℃. Back pressure rise played important role at increasing flow's temperature.
- Despite of additive lack, filter operating was acceptable because of high temperature distribution. It is worth-mentioning, 5.7% of total working time temperature is above 550 ℃ which can guarantee passive system working for a while without additive.



Filter operation status	Excellent ☐ Good ■ Maintenance required ☐ Failed☐

Appendix

As mentioned in the report, because of additive hose problem, system didn't get enough additive during this period. Additive hose are not integrated and was connected to the top of the tank. So bubble formation inside the hose is probable happening.

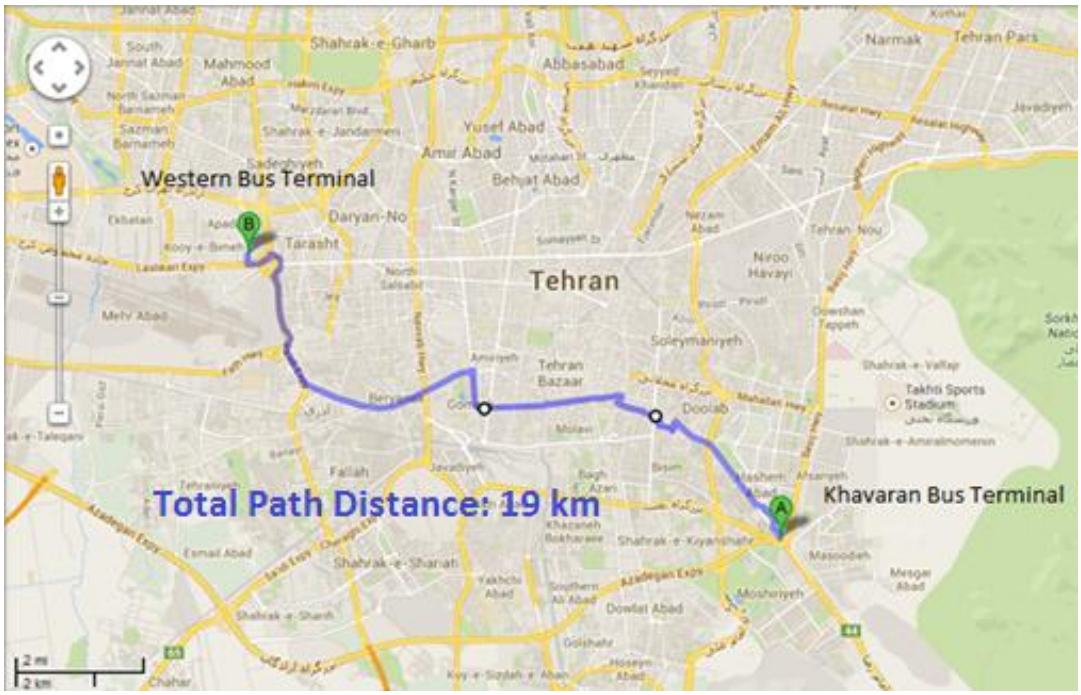


Additive system buble problem

We suggest these items for improving additive system operation.

1- Making hosing system integrated (including inside and outside of additive tank) and connecting the hose to the tank from the bottom, reduce bubble problem possibility.
2- Considering lack of room, downsizing the tank make its installation easier. (5 liter can be appropriate size for Tehran's Bus).
3- For improving tank safety it could be replaced by iron tank.

Vehicle plate number	33572 (28958)
Bus line	Number 2 (west to east bus line)
DPF producer company	HJS_03 (active system with FBC – electrical heater)



Overall Information

Table1- Overall Information

Vehicle plate number	33572 (28958)
CPK data logger number	LN: 001521, DN: 1995, Sim Number +989218469643
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF producer company	HJS_03 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	01/Aug/2015 – 15/Aug/2015 (fifteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.04 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been working from installation date until now without any cleaning.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	26072 km
Bus mileage over the period	2550 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	186 hours 57 minutes
Average working hours per day (including stop days)	12 hours 27 minutes
Bus average speed	13.64 km/hr
idle speed time to all working time ration	53.81 %
Total Bus fuel consumption over the period	1545 lit
Fuel consumption per hour	8.26 lit/hr
Average fuel consumption	0.61 lit/km
Total Bus additive consumption over the period	0.649 lit
Average additive consumption	254 cc/km
Additive consumption to fuel ration	420 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

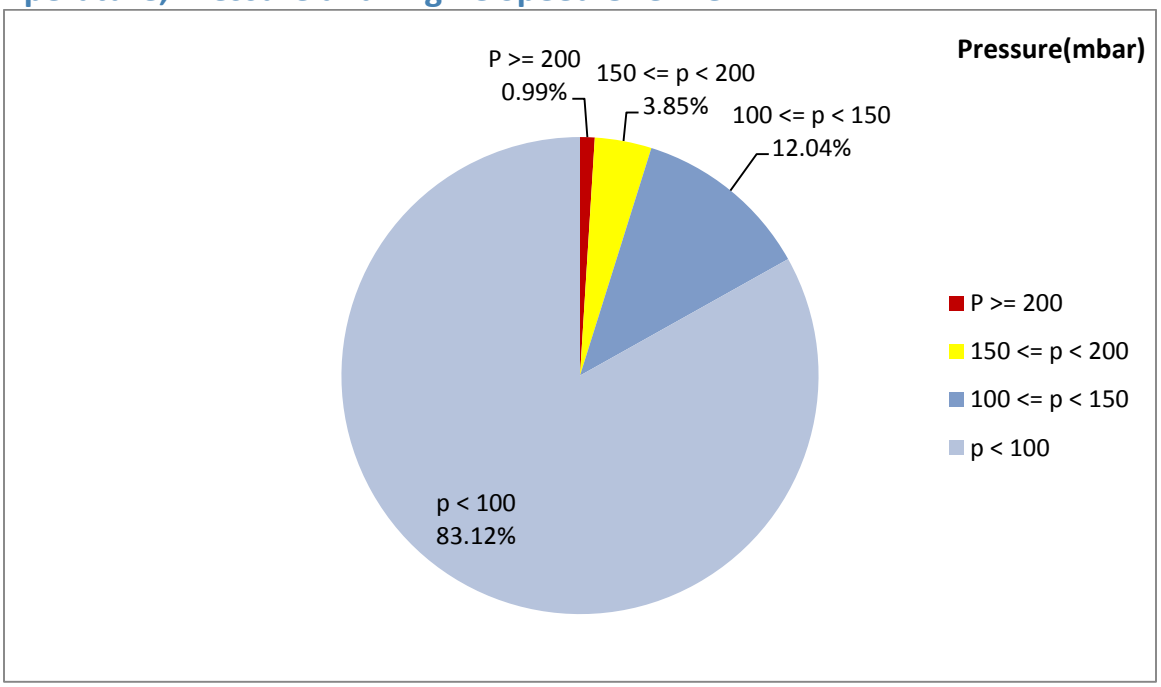


Figure 1- Pressure distribution over the working hours

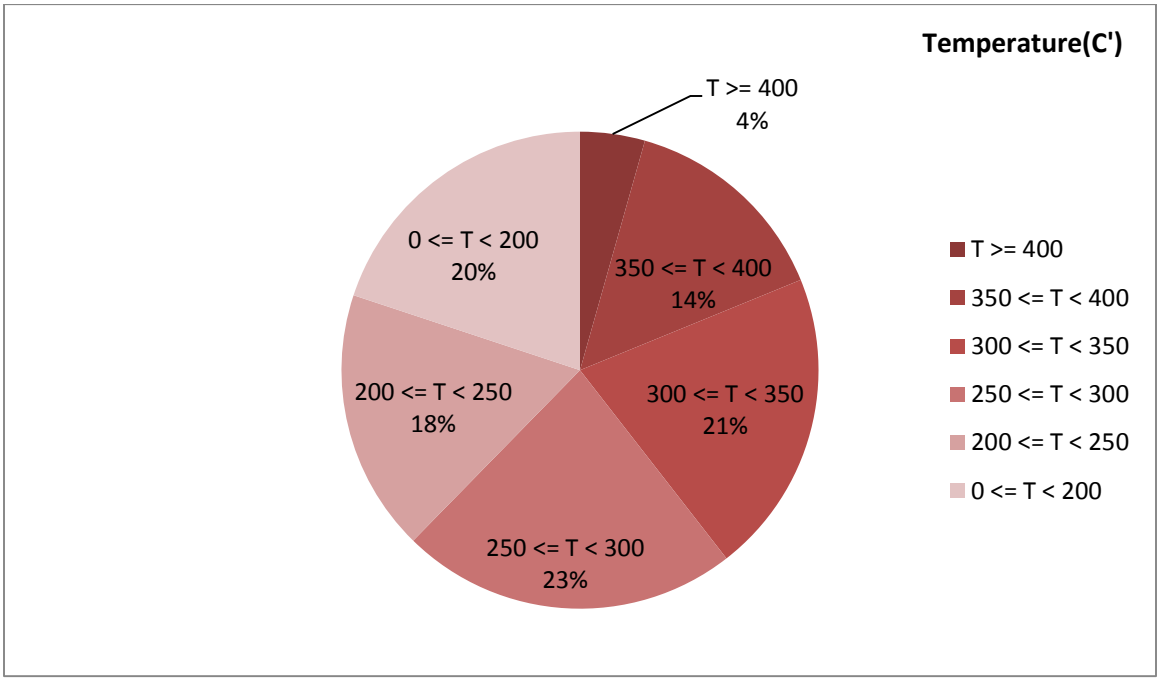


Figure 2-Temperature distribution over the working hours

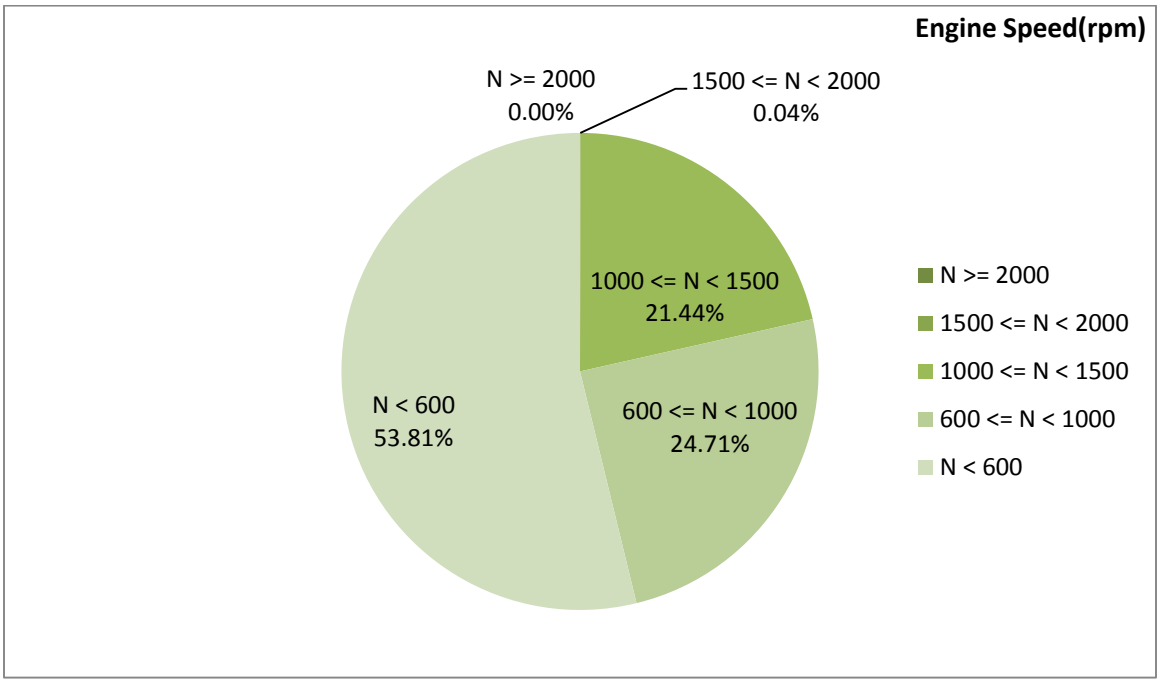


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
274.97	54.95	735

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
331.57	90.75	957

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	441-0	1712-512

Detailed Pressure Analysis

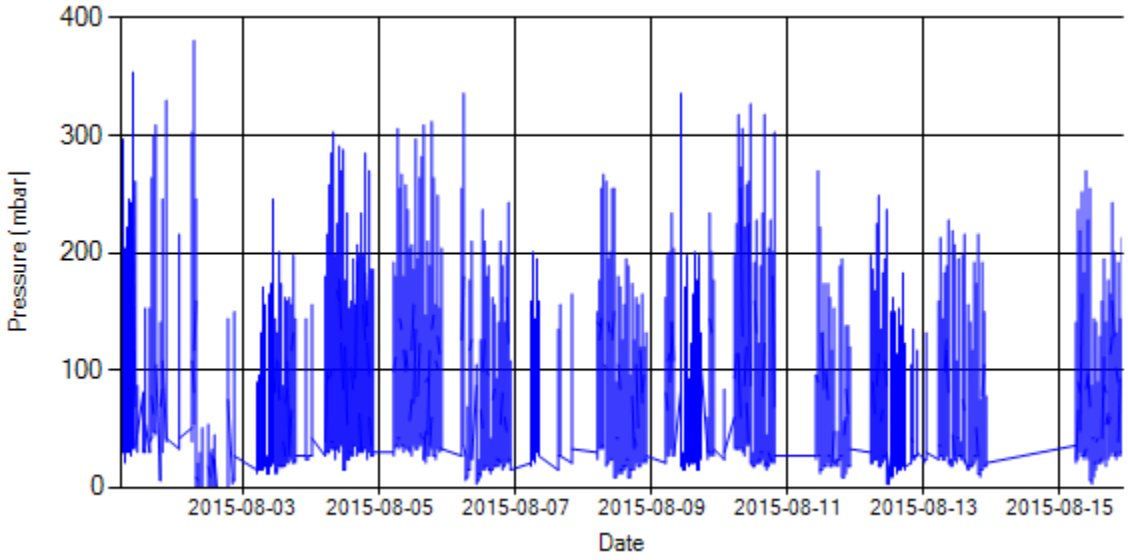


Figure 4- Pressure distribution over the period

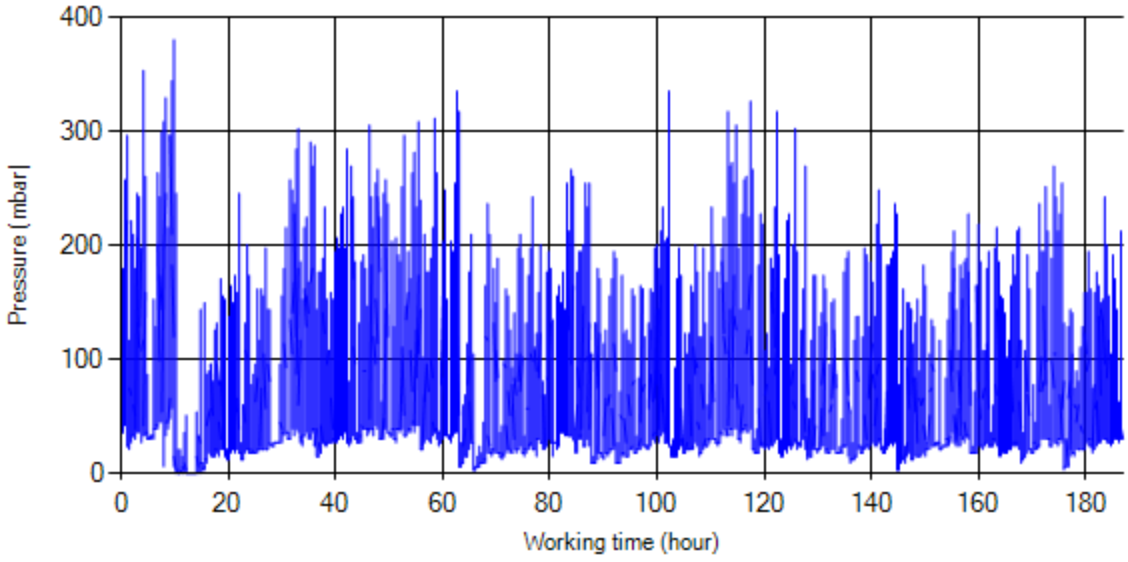


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

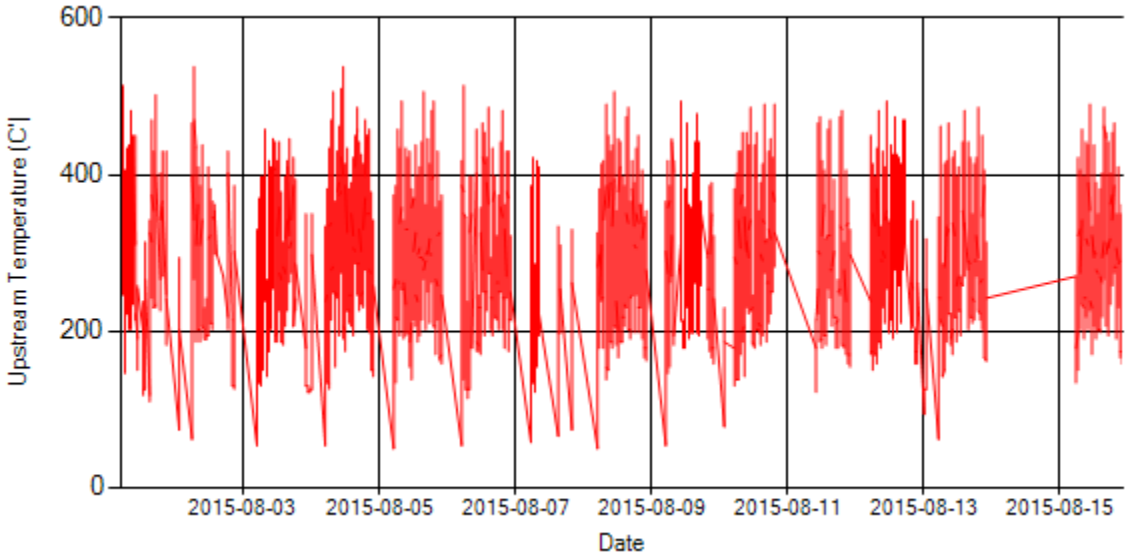


Figure 6- Temperature distribution over the period

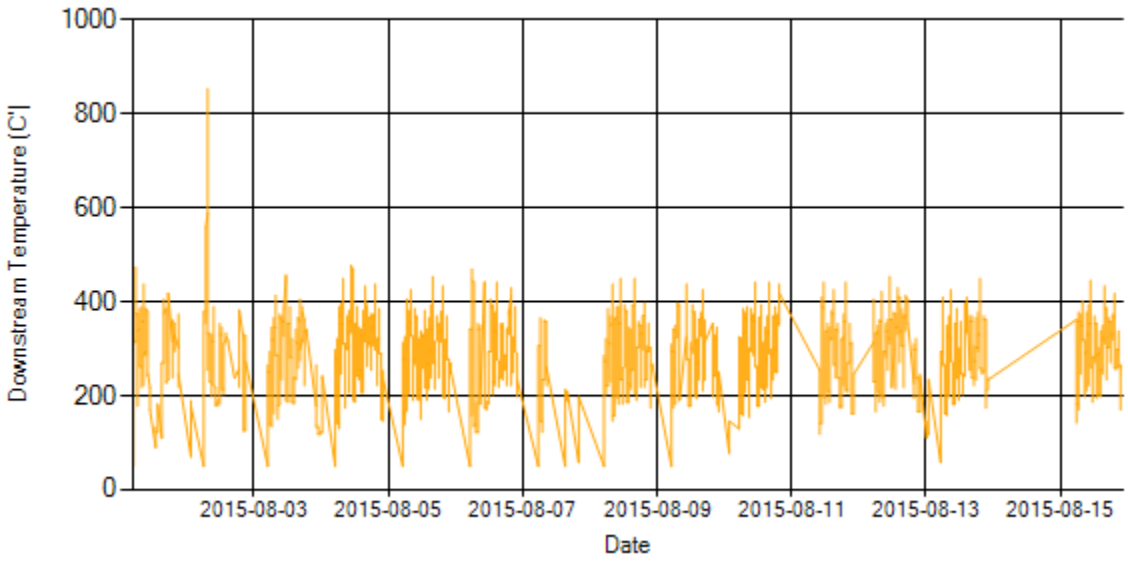


Figure 7- Temperature distribution over the period

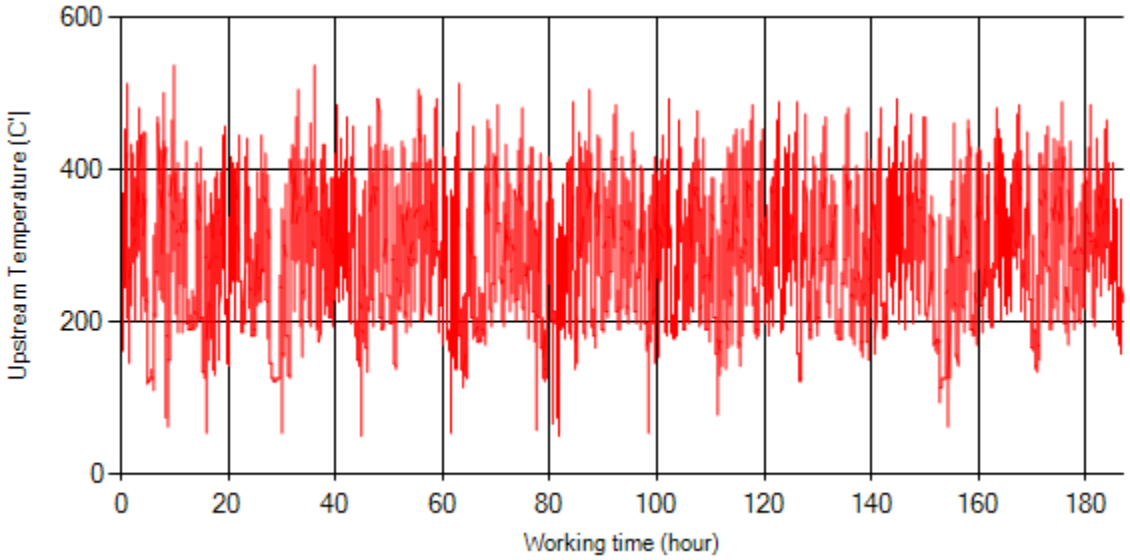


Figure 8- Temperature vs. working hours

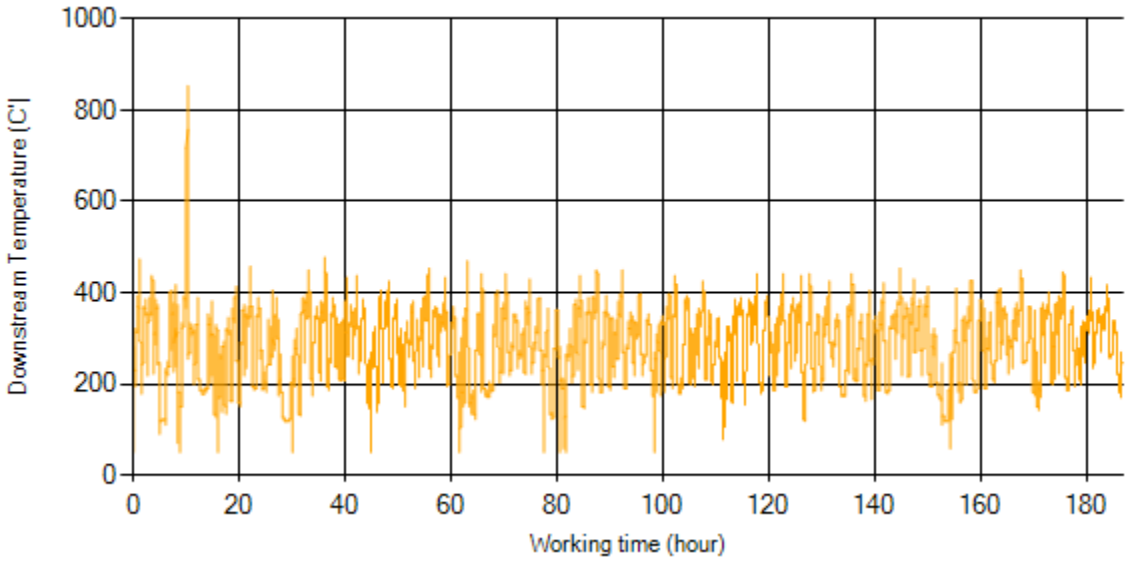


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

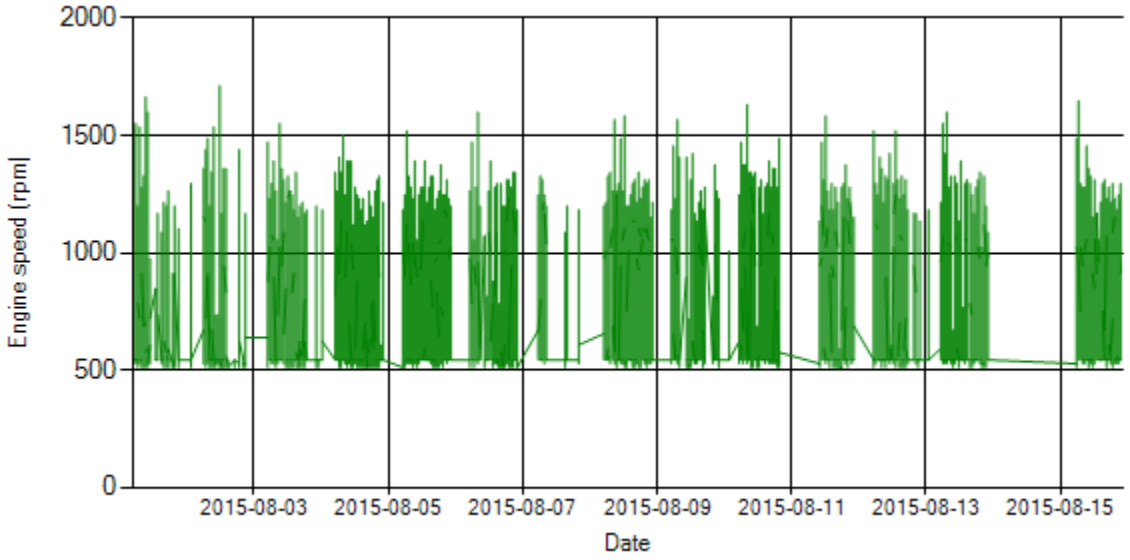


Figure 10- Engine speed distribution over the period

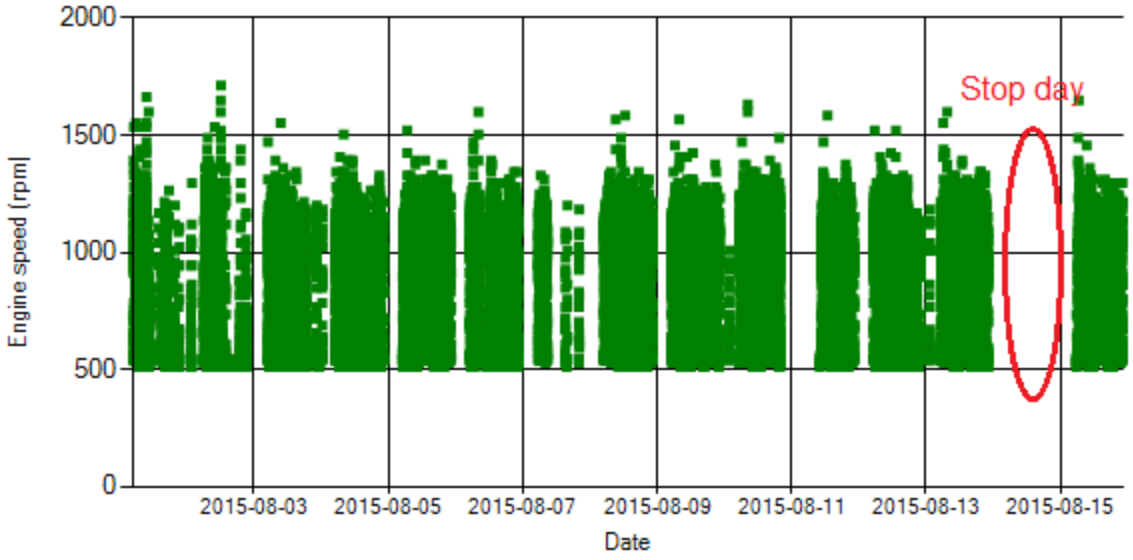


Figure 11- Engine speed diagram for calculating CPK's working days

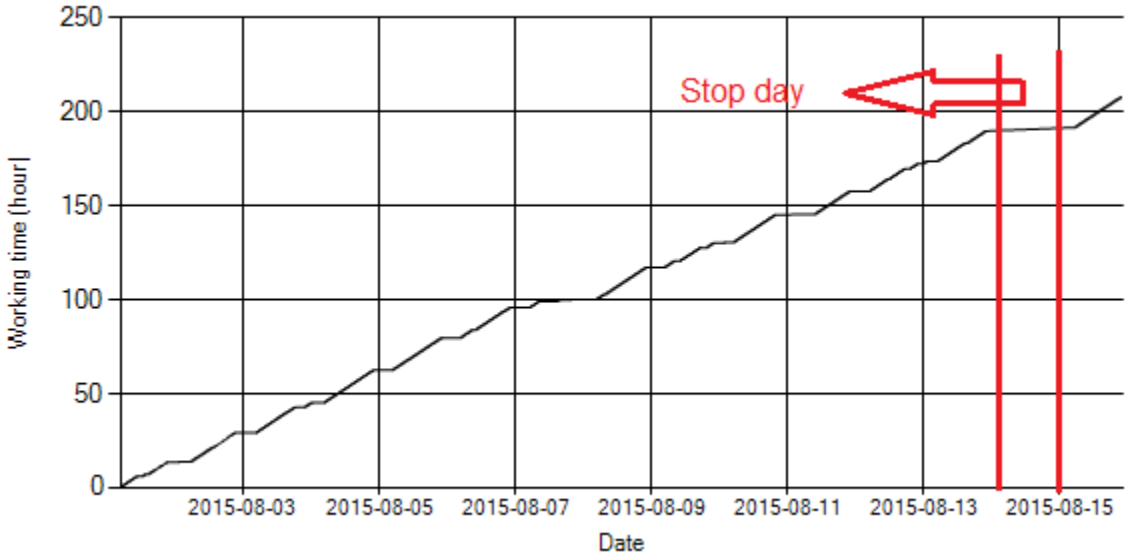


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger didn't sample on Aug 14th because of stop day.

Pressure-Engine Speed diagrams

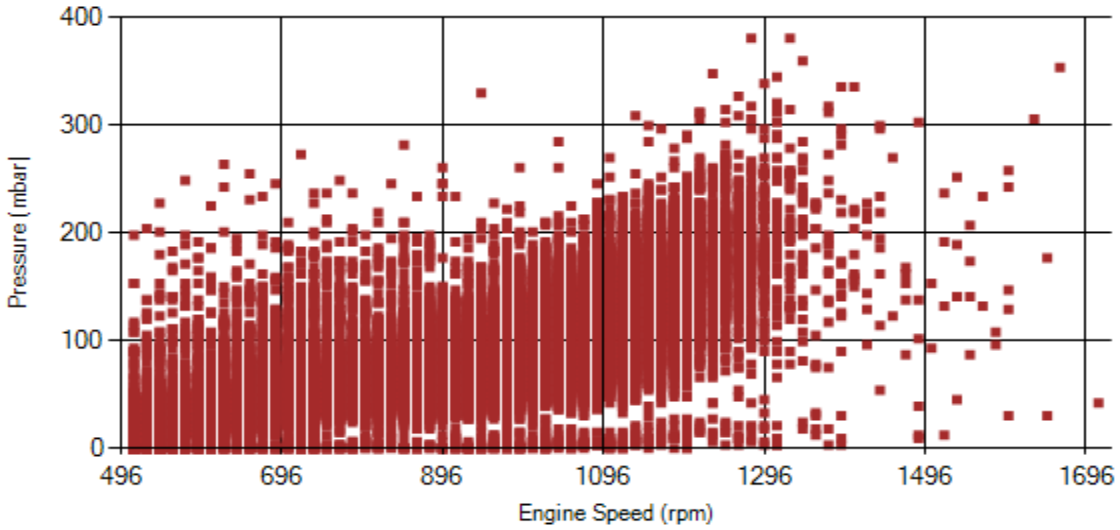


Figure 13- Pressure against engine speed

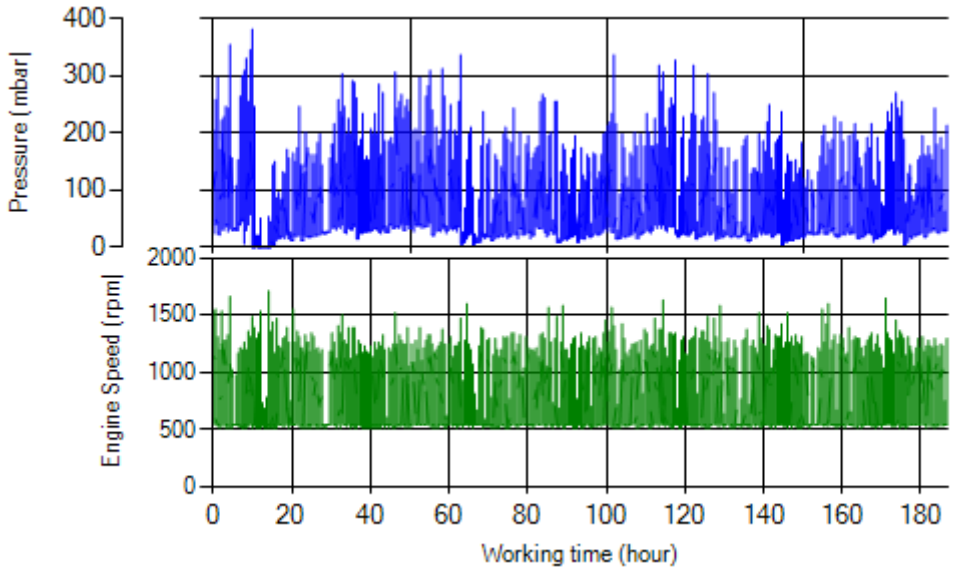


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

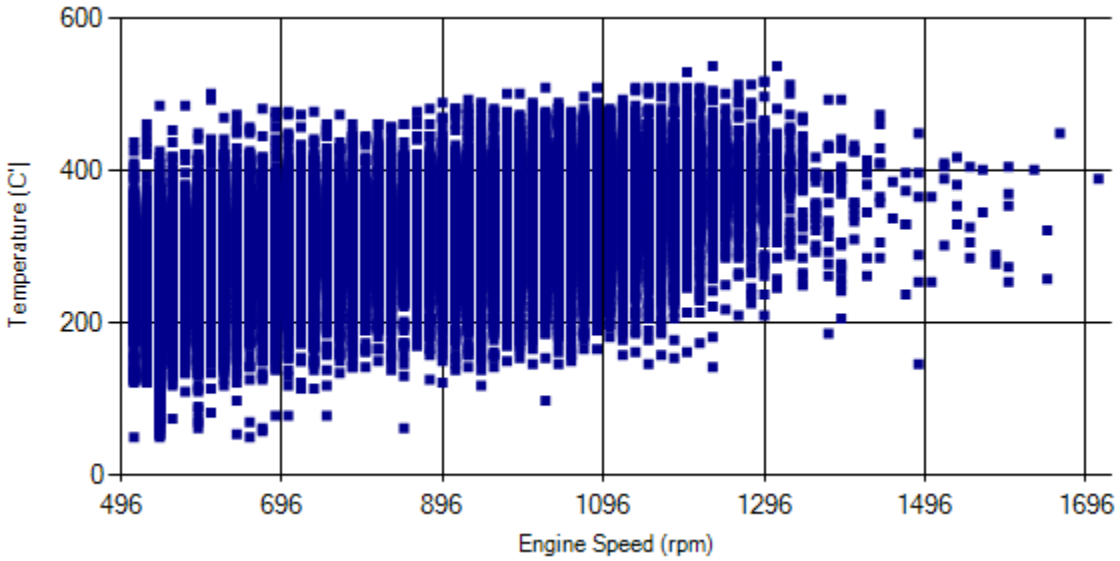


Figure 15- Temperature against engine speed

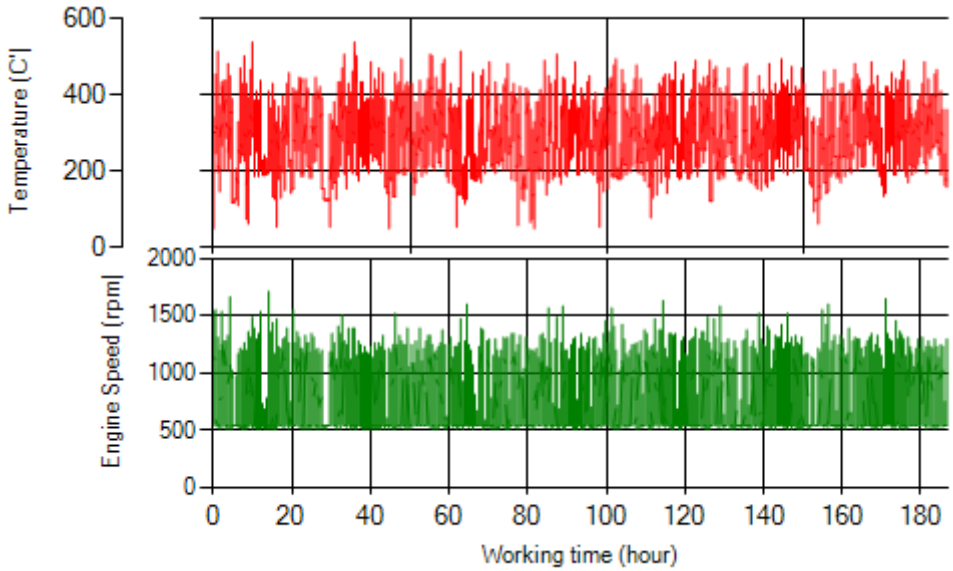


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.99% of total working time pressure is above 200 mbar and 3.84% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 3 % of total working time temperature is above 400℃. Considering temperature distribution of this line's buses (T400<<1%), it is clear this distribution was because of high back pressure.

Filter operation status	Excellent ☐	Good ■
	Maintenance required ☐	Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	33572 (28958)
CPK data logger number	LN: 001521, DN: 1995, Sim Number +989218469643
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF producer company	HJS_03 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Aug/2015 – 31/Aug/2015 (sixteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.04 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been working from installation date until now without any cleaning.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	27434 km
Bus mileage over the period	1362 km
Working days over the period	10 days
Stop days	6 days
Data logger working days	10 days
Working hours over the period	147 hours 31 minutes
Average working hours per day (including stop days)	9 hours13 minutes
Bus average speed	9.23 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	850 lit
Fuel consumption per hour	5.76 lit/hr
Average fuel consumption	0.62 lit/km
Total Bus additive consumption over the period	0.349 lit
Average additive consumption	255 cc/km
Additive consumption to fuel ration	410 cc per 1000 lit (batch dosing with tank level)

Notice: RPM sensor got problem during this period. So some related parameters and information are unreliable.

Temperature, Pressure and Engine Speed Overview

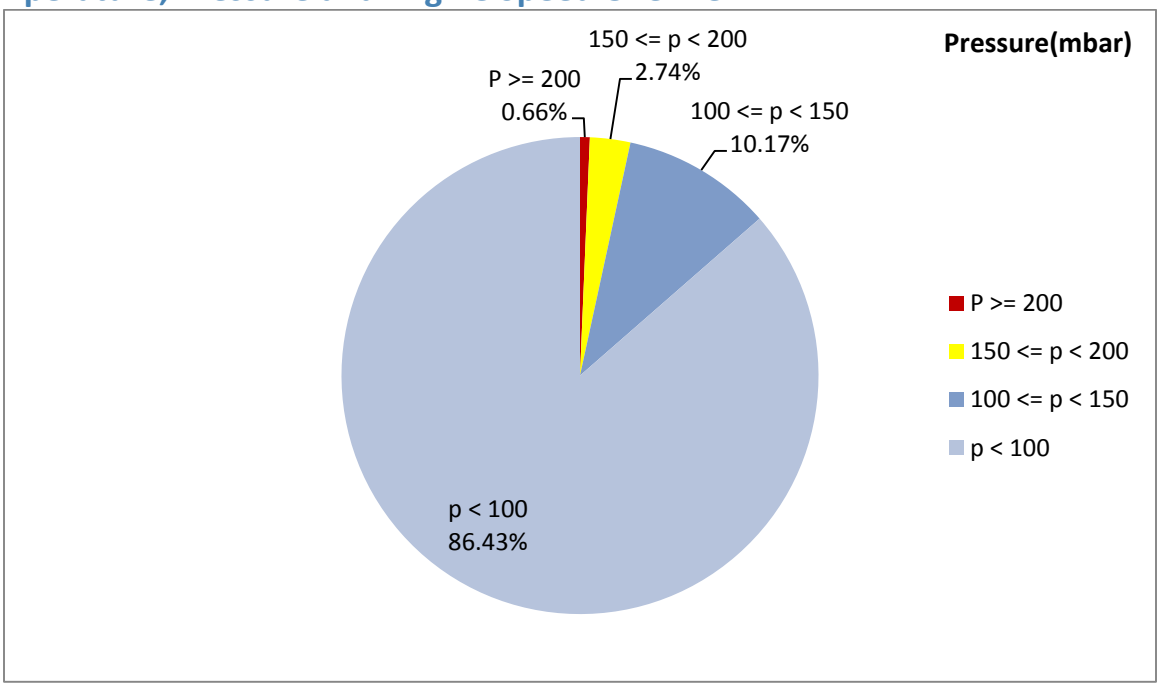


Figure 1- Pressure distribution over the working hours

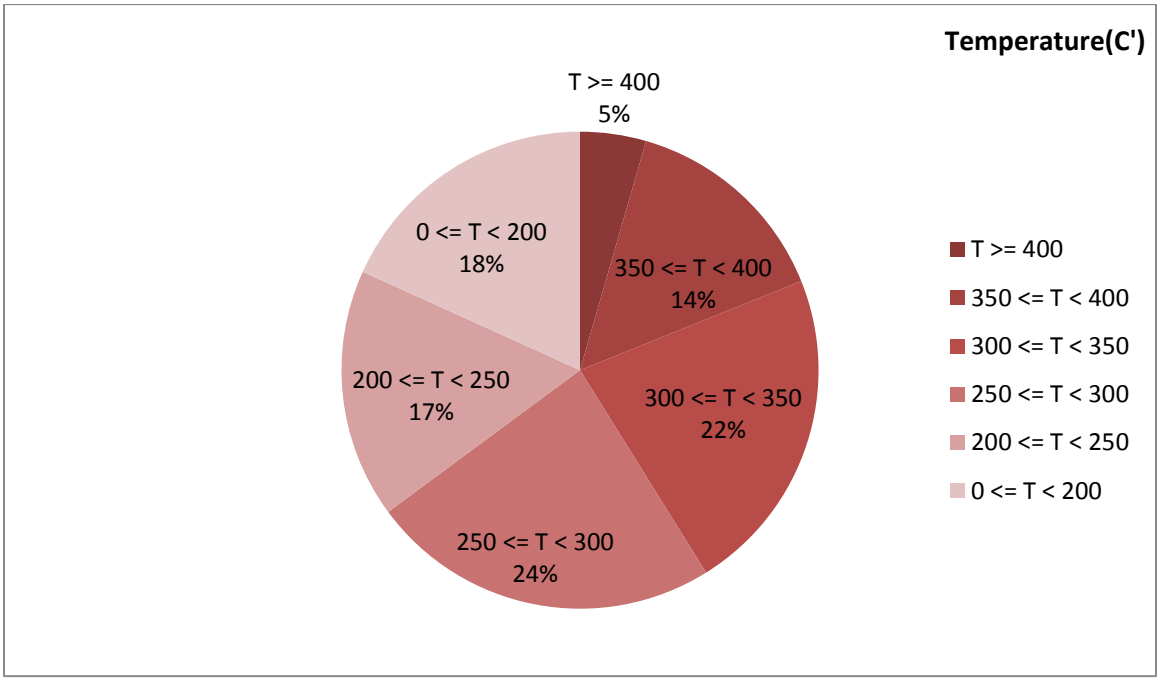


Figure 2-Temperature distribution over the working hours

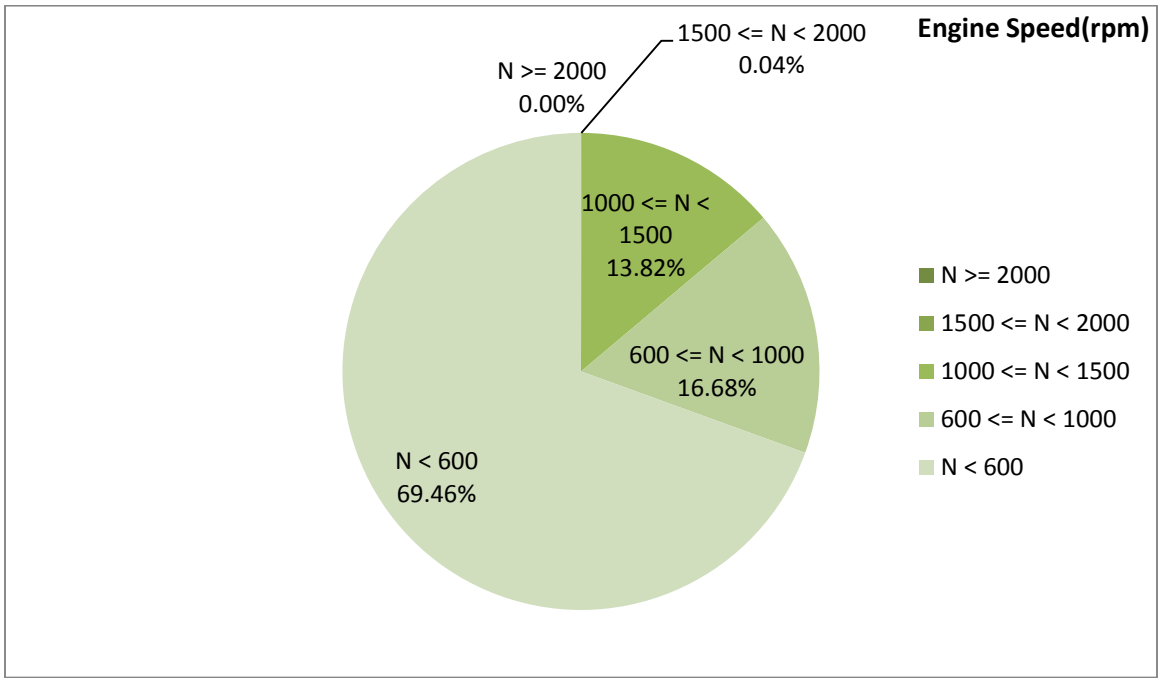


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
277.15	50.73	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
-	-	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
506-50	366-0	-

Notice: RPM sensor got problem during this period. So some related parameters and information are unreliable.

Detailed Pressure Analysis

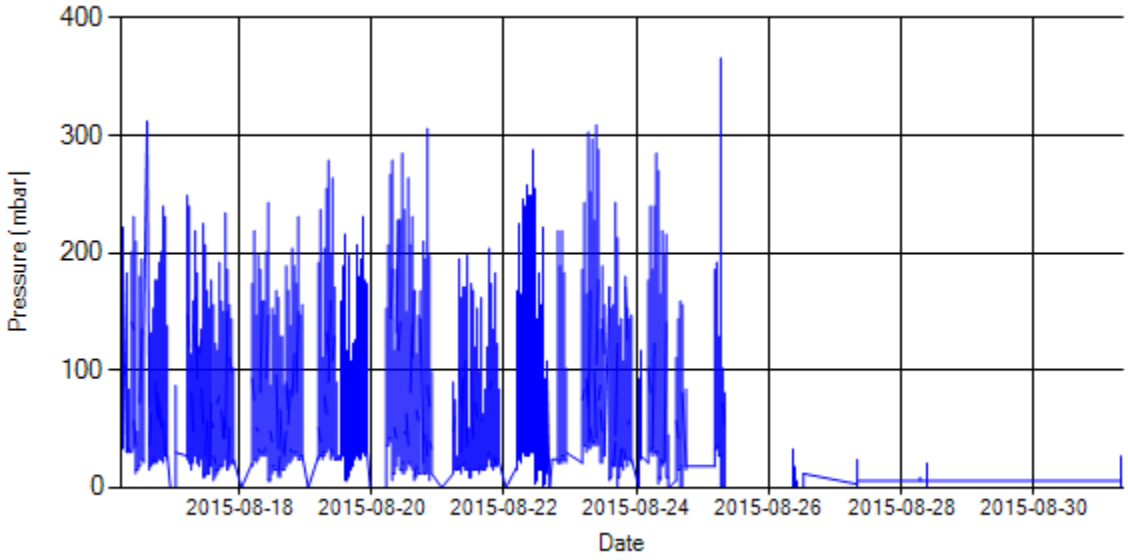


Figure 4- Pressure distribution over the period

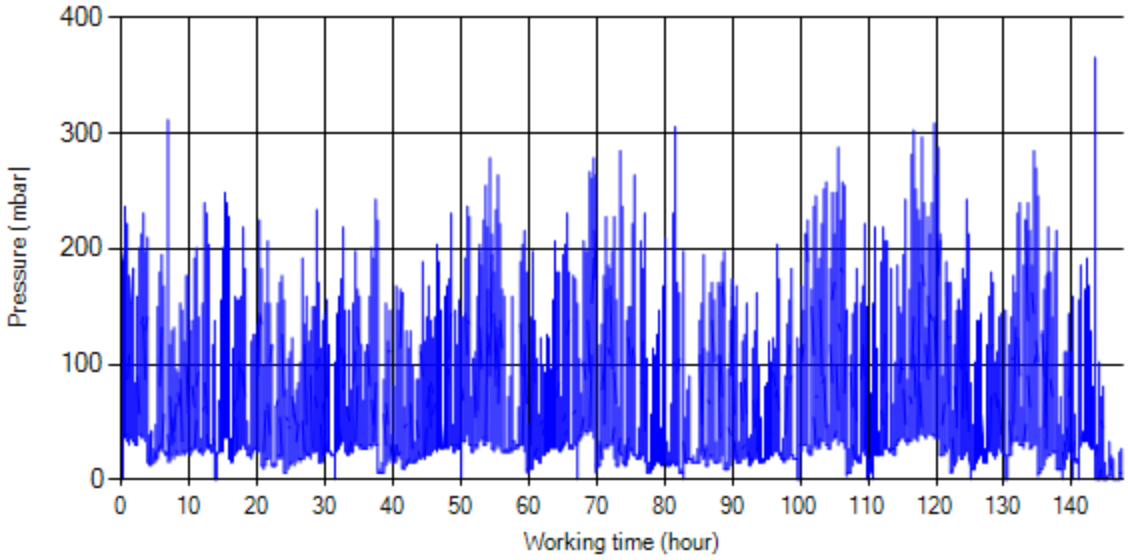


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

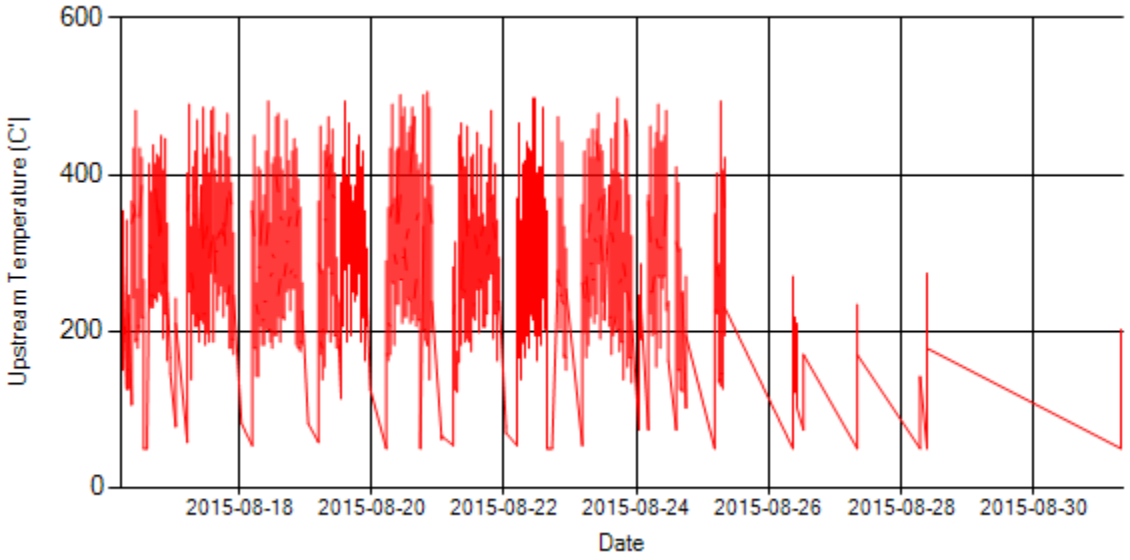


Figure 6- Temperature distribution over the period

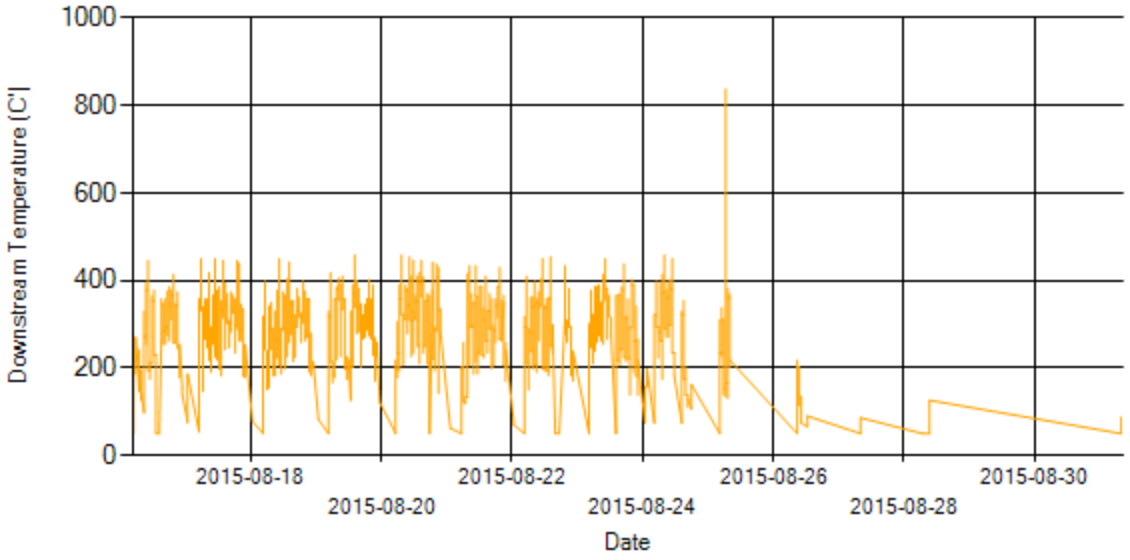


Figure 7- Temperature distribution over the period

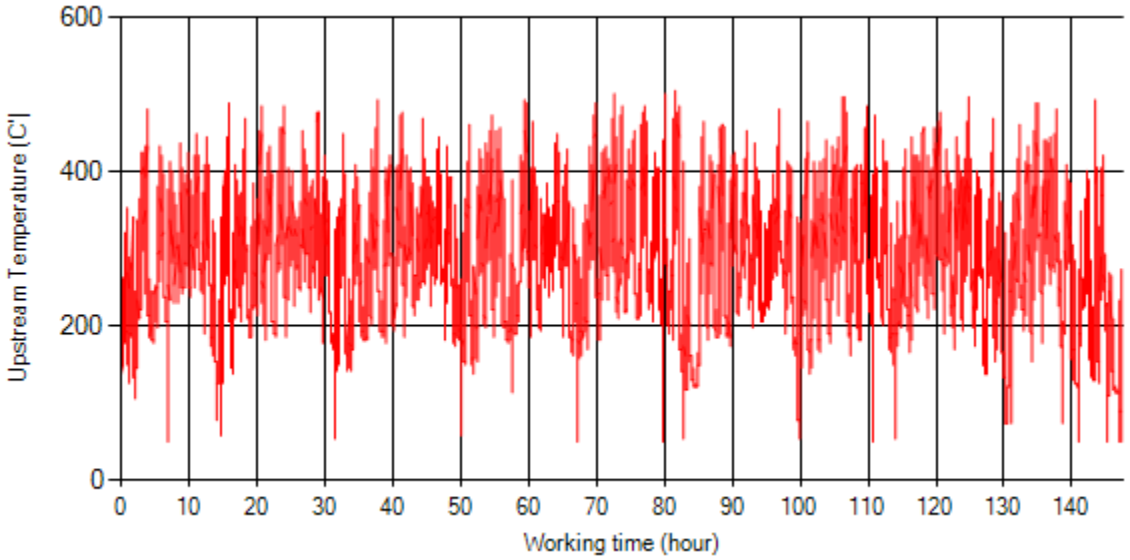


Figure 8- Temperature vs. working hours

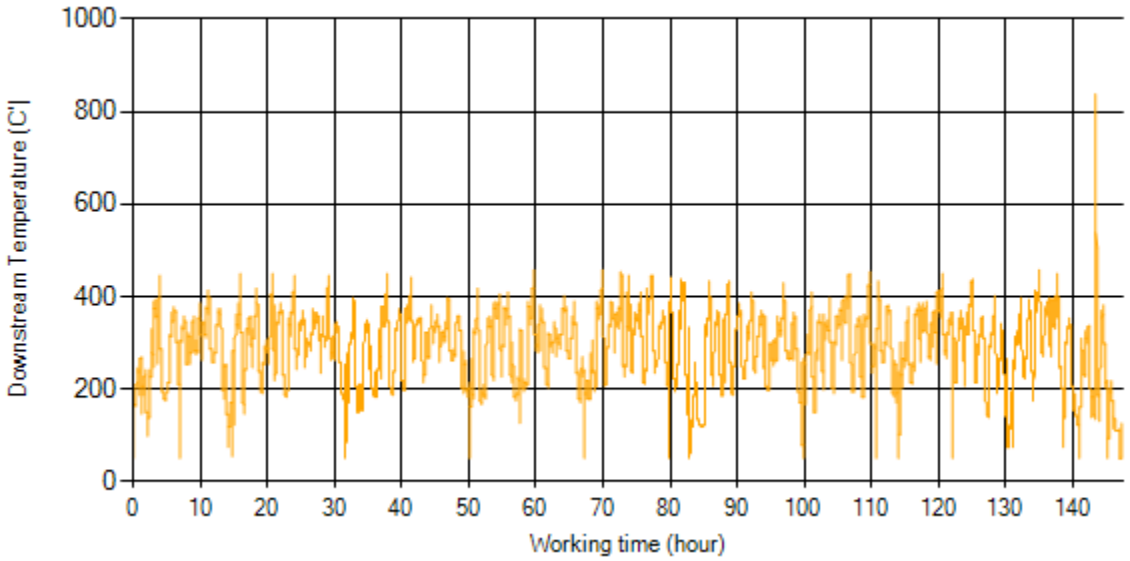


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

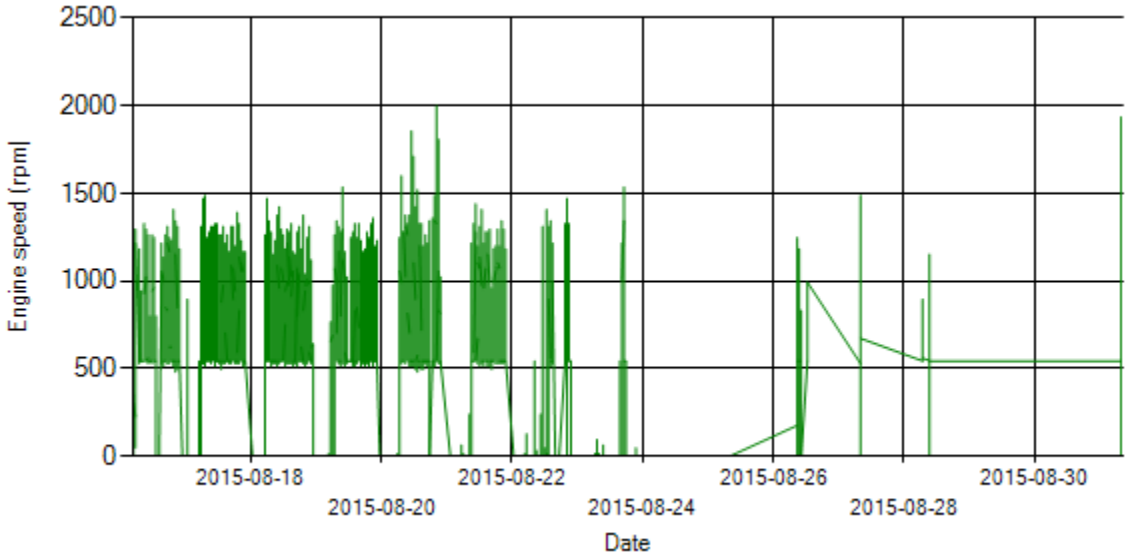


Figure 10- Engine speed distribution over the period

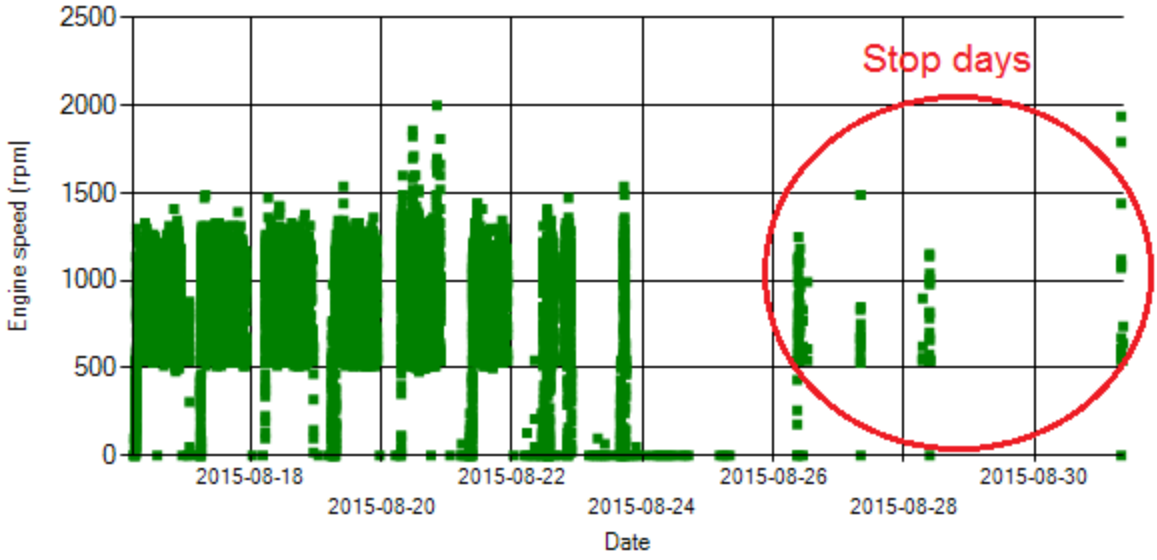


Figure 11- Engine speed diagram for calculating CPK's working days

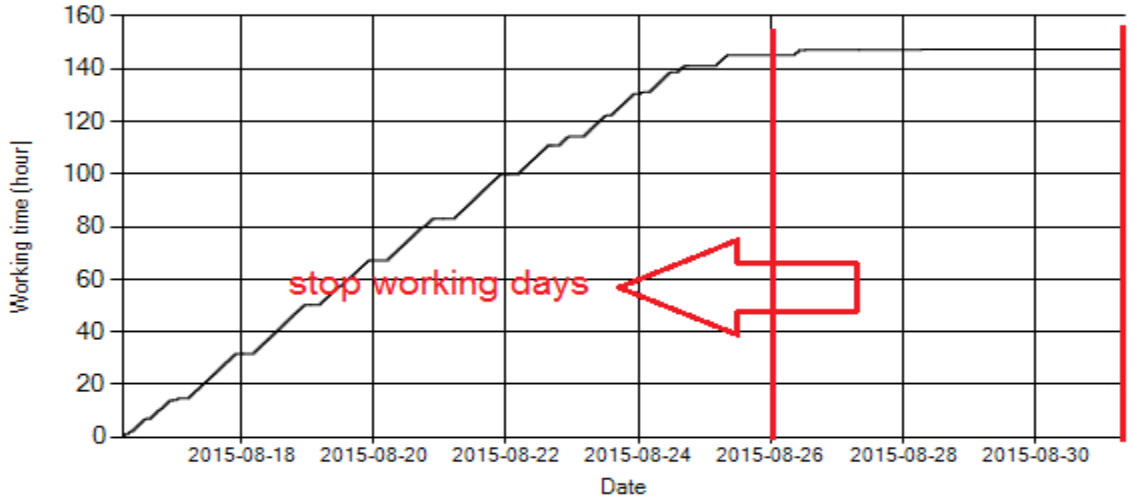


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data.

Pressure-Engine Speed diagrams

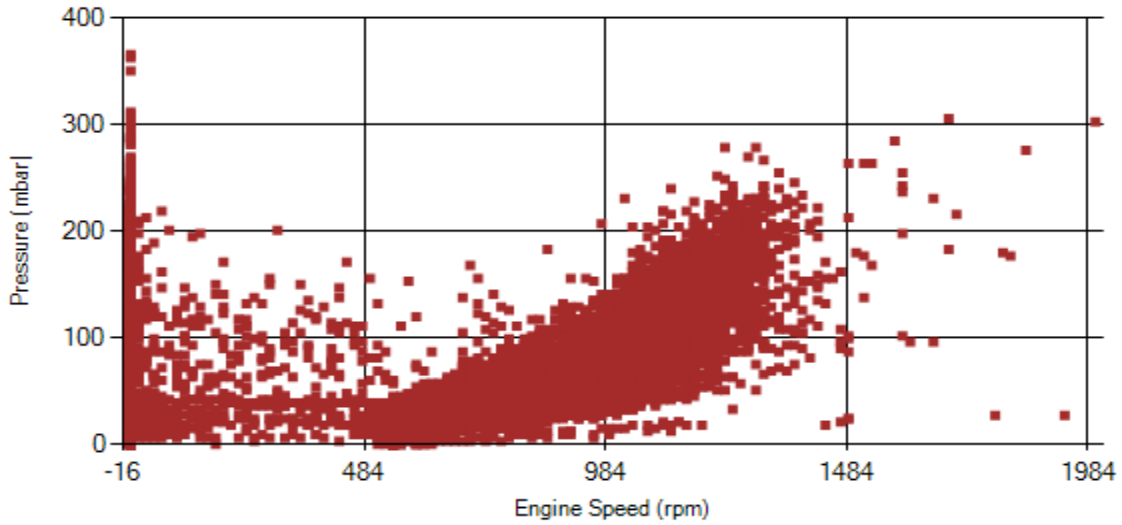


Figure 13- Pressure against engine speed

Notice: This diagrams unconventional appearance is because of rpm sensor problem.

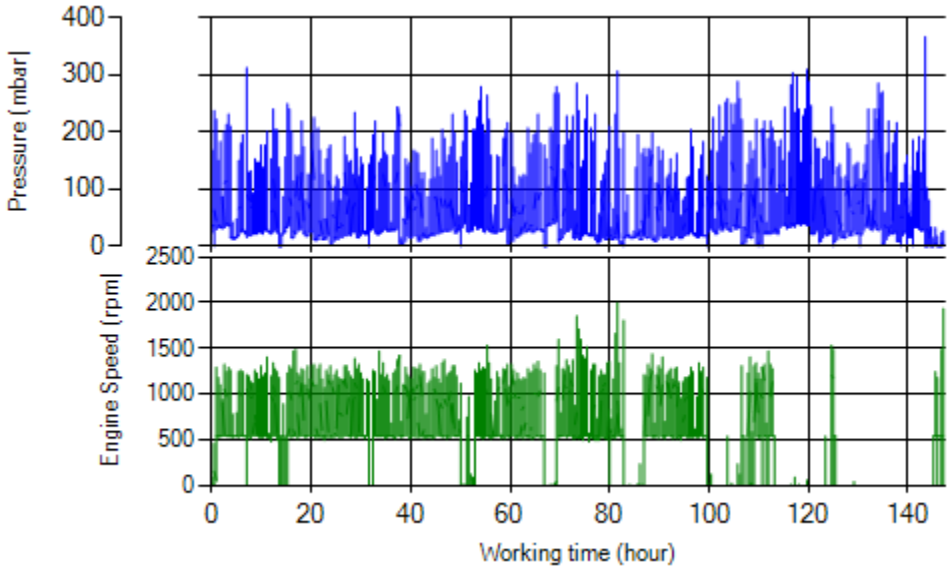


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

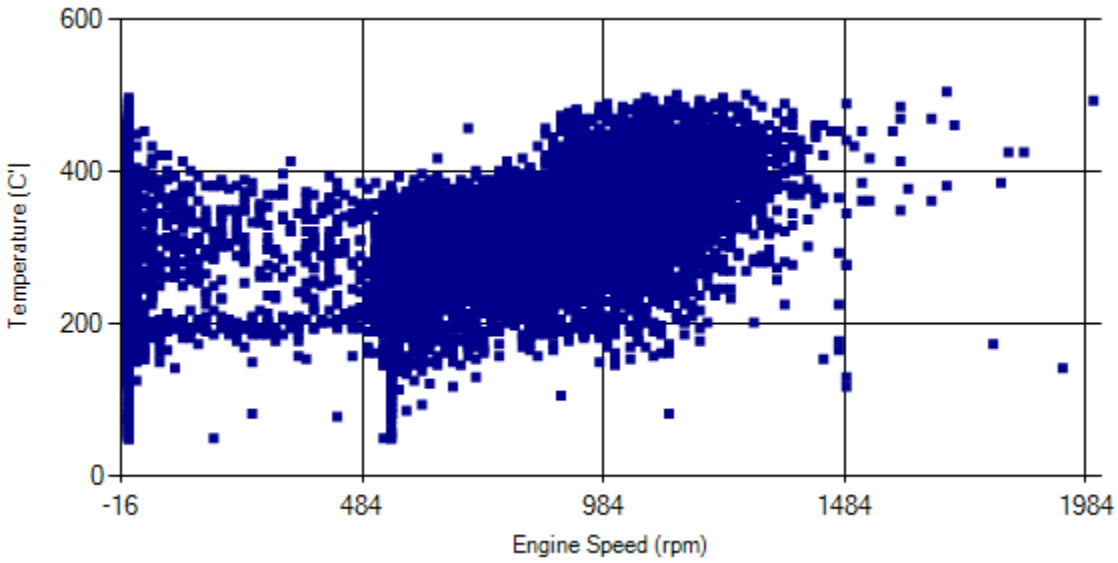


Figure 15- Temperature against engine speed

Notice: This diagrams unconventional appearance is because of rpm sensor problem.

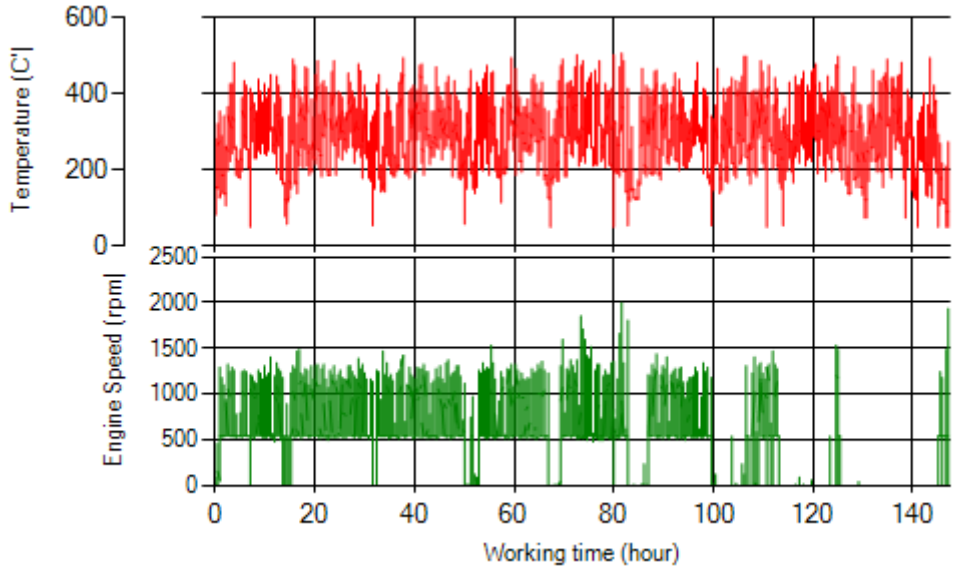


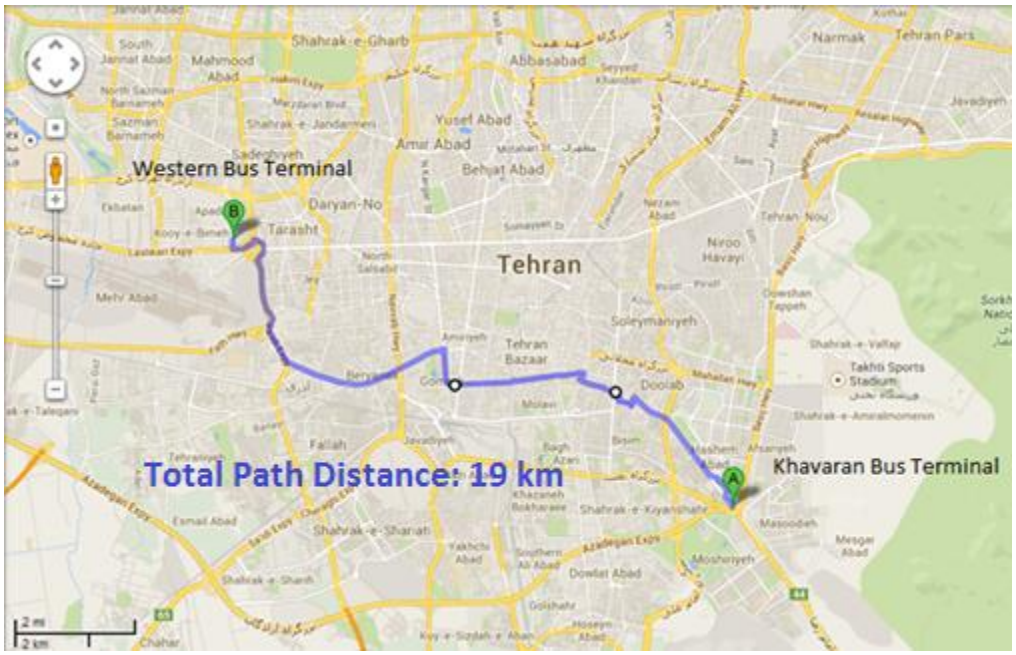
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.66% of total working time pressure is above 200 mbar and 3.40% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 5% of total working time temperature is above 400°C. Considering temperature distribution of this line's buses (T400<<1%), it is clear this distribution was because of high back pressure.

Filter operation status	Excellent ☐ Good ■ Maintenance required ☐ Failed☐

Vehicle plate number	33637 (34119)
Bus line	Number 2 (west to east bus line)
DPF producer company	Dinex_02 (Passive system with FBC)



Overall Information

Table1- Overall Information

Vehicle plate number	33637 (34119)
CPK data logger number	LN: 001492, DN: 1933, Sim +989210000000
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF company producer	Dinex_02 (Passive system with FBC)
Installation date	02/Jun/2015
Report period	23/Aug/2015 – 01/Sep/2015 (ten days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been removed after two weeks working on Jun 17th. After receiving cleaning machine DPF was cleaned on Aug 10th and was installed on Aug 22nd.
Dosing status	Additive dosing was increased to 160% of its initial value.

Table 3- Fuel and Additive Consumption Information

Bus mileage over the period	1662 km
Working days over the period	9 days
Stop days	1 day
Data logger working days	9 days
Working hours over the period	162 hours 23 minutes
Average working hours per day (including stop days)	16 hours 15 minutes
Bus average speed	10.22 km/hr
idle speed time to all working time ration	54 %
Total Bus fuel consumption over the period	1166 lit
Fuel consumption per hour	7.2 lit/hr
Average fuel consumption	0.70 lit/km
Total Bus additive consumption over the period	0.467 lit
Average additive consumption	281 cc/km
Additive consumption to fuel ration	400 cc/1000lit

Temperature, Pressure and Engine Speed Overview

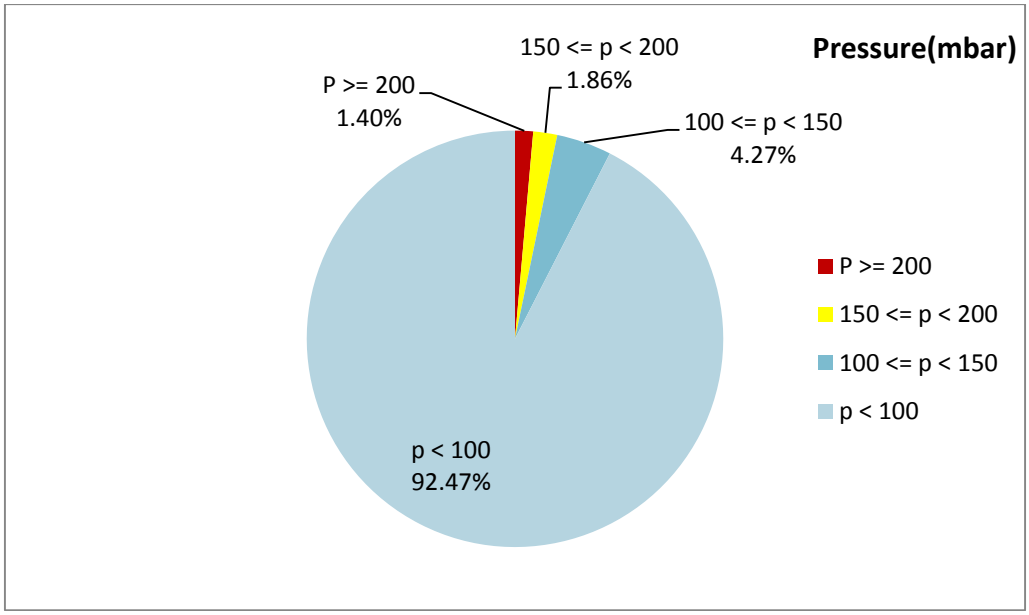


Figure 1- Pressure distribution over the working hours

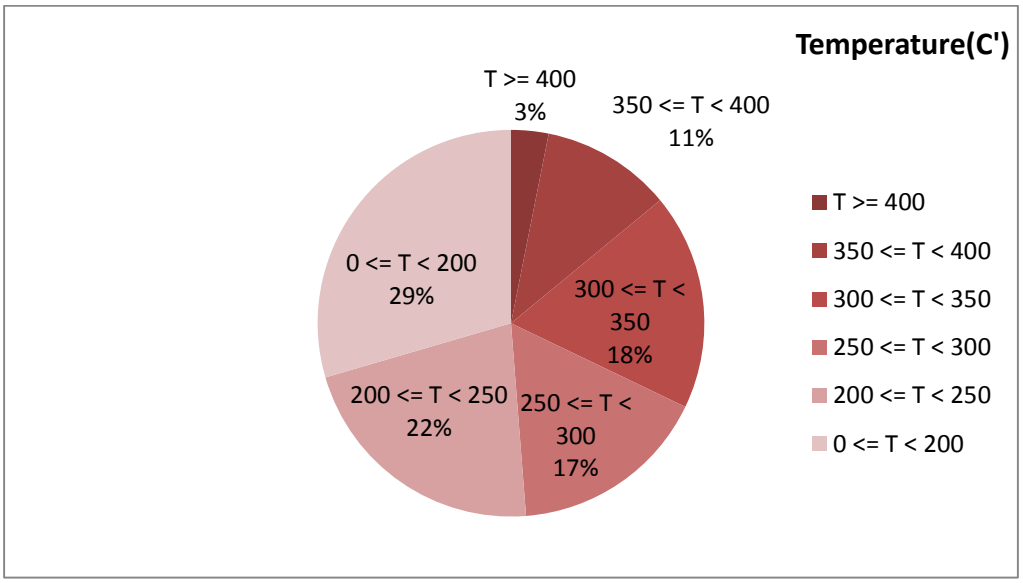


Figure 2-Temperature distribution over the working hours

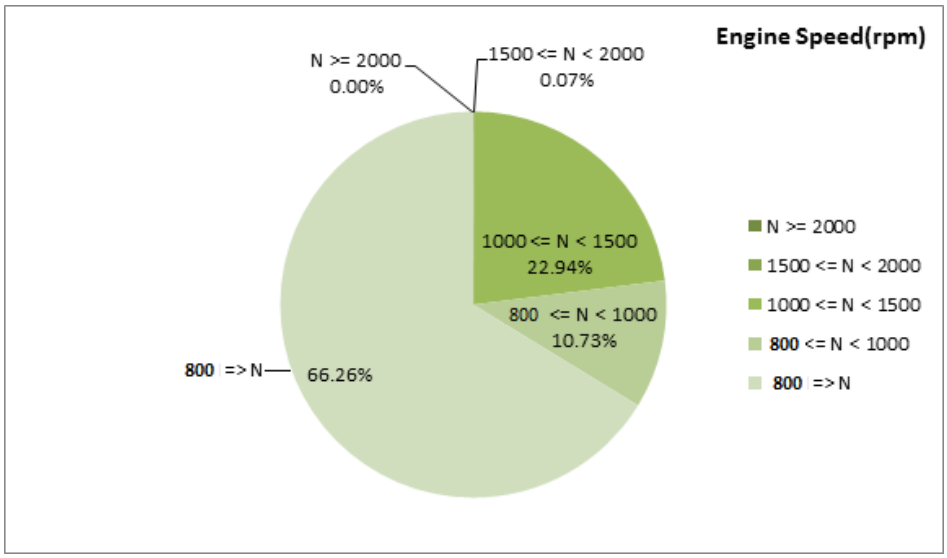


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
249.78	32.06	800

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
275.25	46.15	980

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
542-50	483-0	1776-32

Detailed Pressure Analysis

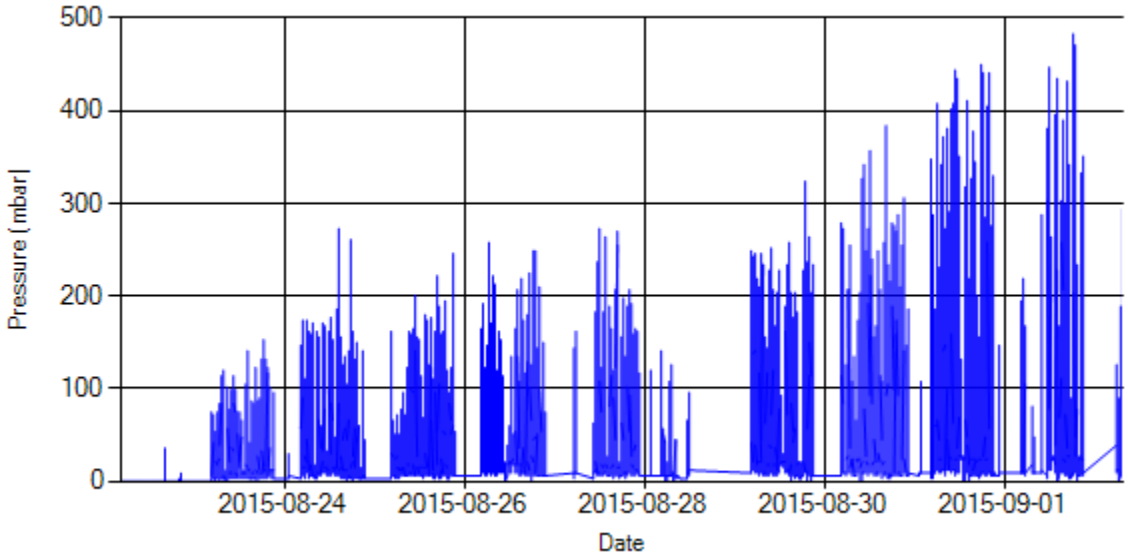


Figure 4- Pressure distribution over the period

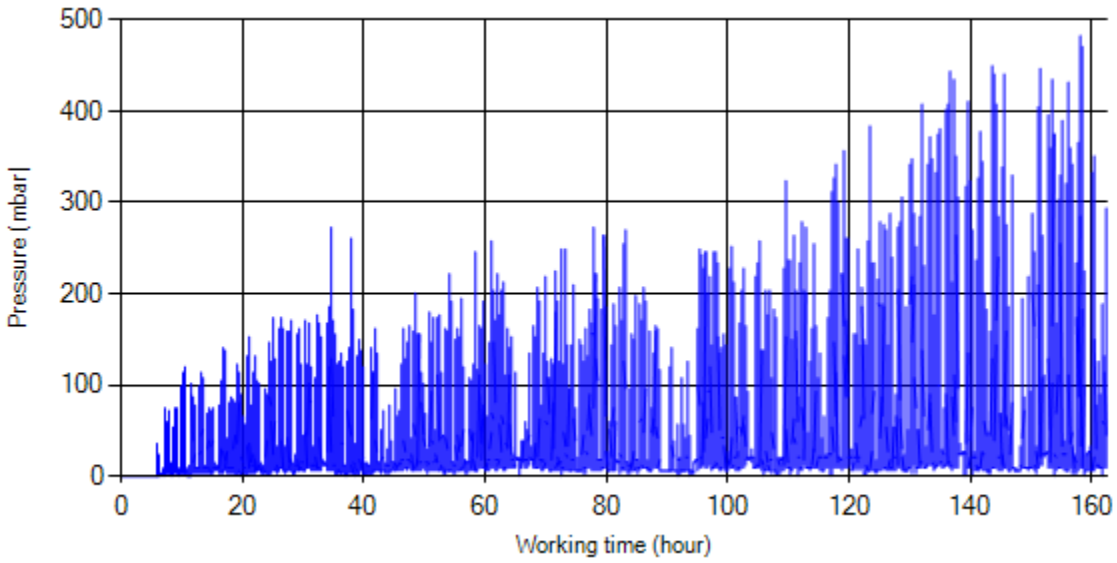


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Notice: For getting more information about pressure distribution and DPF loading rate table 7 can be useable.

Table 7. Pressure Statistics

Date	P-Average(mbar)	P>150 mbar	P>200 mbar	P>300 mbar	P-max(mbar)
08/23	18.13	0.03%	0.00%	0.00%	153
08/24	27.08	0.75%	0.05%	0.00%	273
08/25	26.58	0.64%	0.11%	0.00%	264
08/26	31.99	1.15%	0.25%	0.00%	258
08/27	34.66	1.19%	0.39%	0.00%	273
08/28	-	-	-	-	-
08/29	40.24	3.17%	0.98%	0.02%	324
08/30	44.46	5.3%	1.96%	0.11%	384
08/31	53.15	10.03%	5.58%	1.22%	450
09/01	47.47	8.18%	4.87%	1.21%	483

Notice: 08/28 was stop day.

Detailed Temperature Analysis

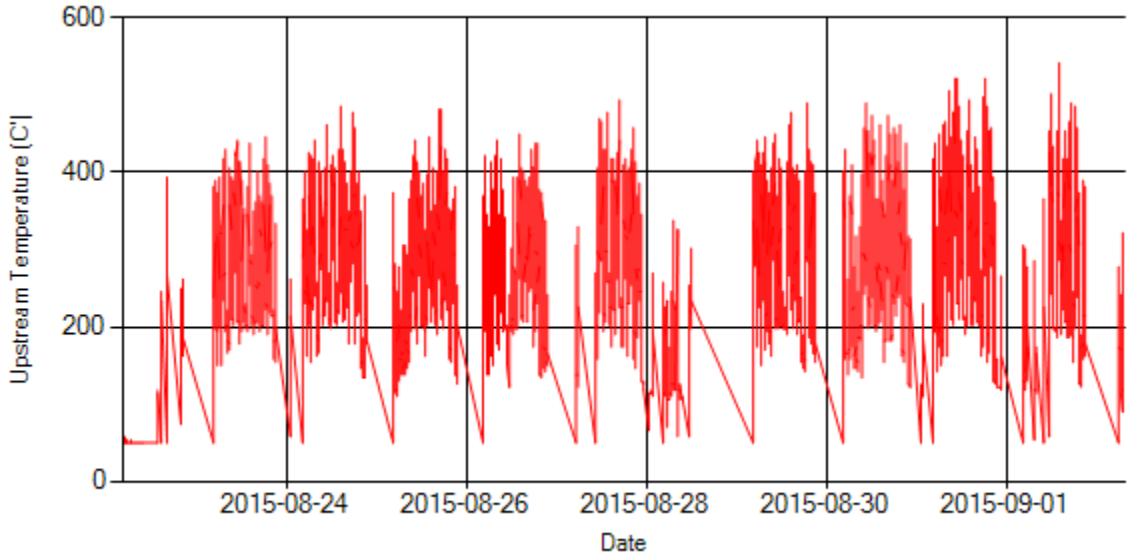


Figure 6- Temperature distribution over the period

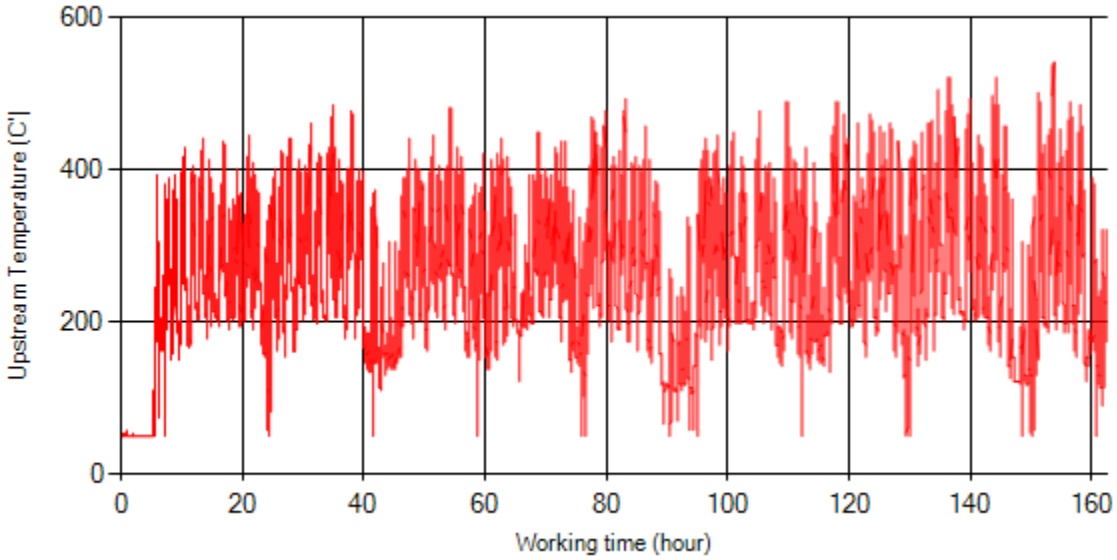


Figure 7- Temperature vs. working hours

Engine Speed Diagrams

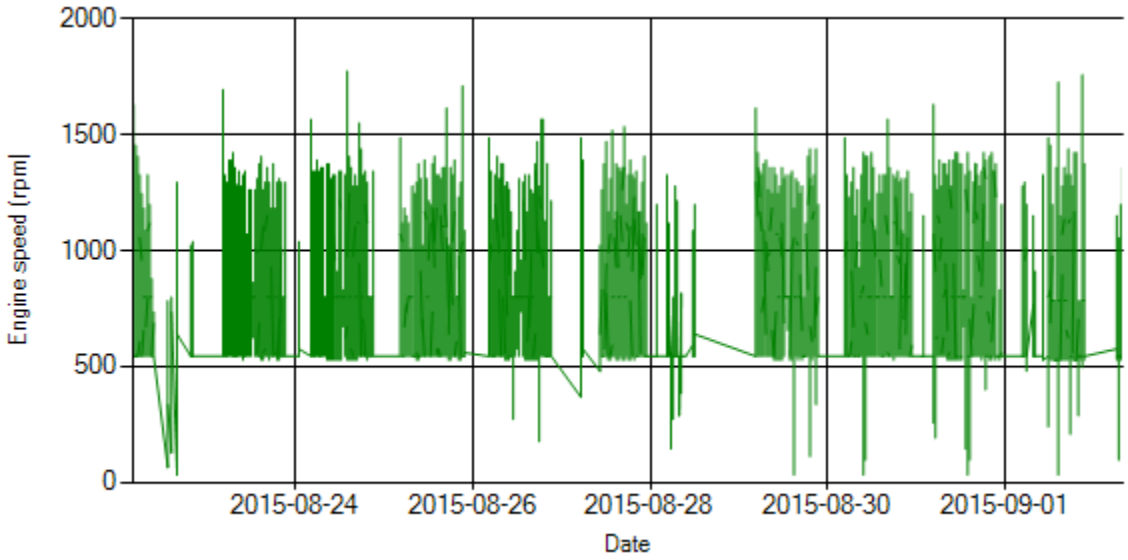


Figure 8- Engine speed distribution over the period

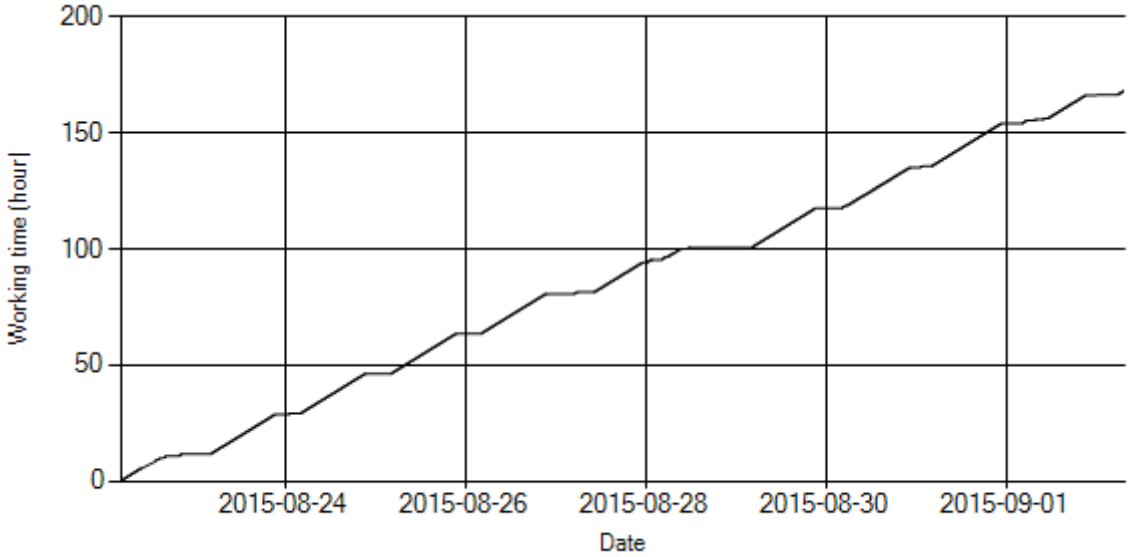


Figure 9- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in the picture, Aug 28th was stop day.

Pressure-Engine Speed diagrams

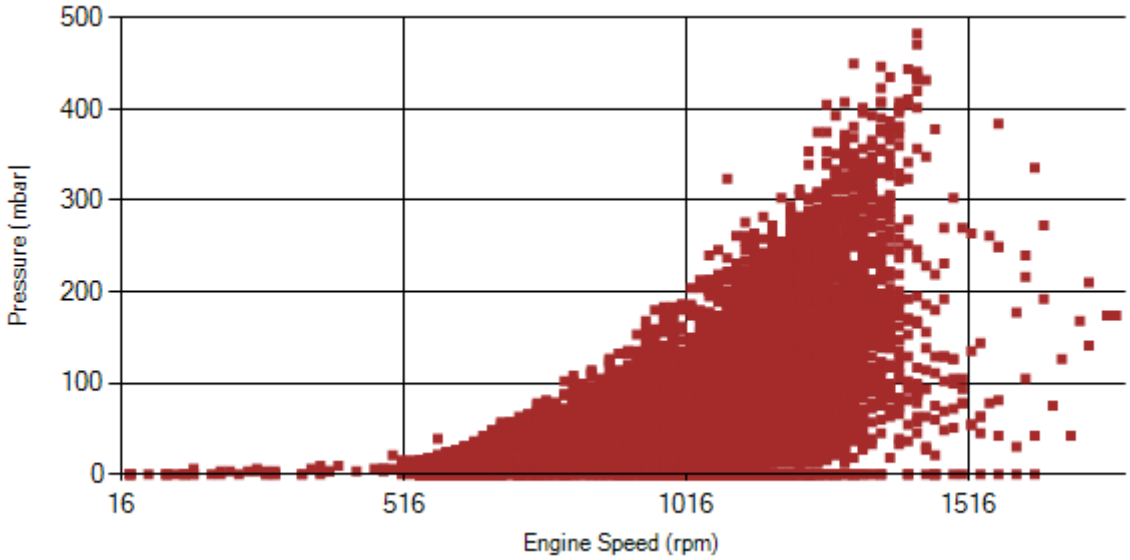


Figure 10- Pressure against engine speed

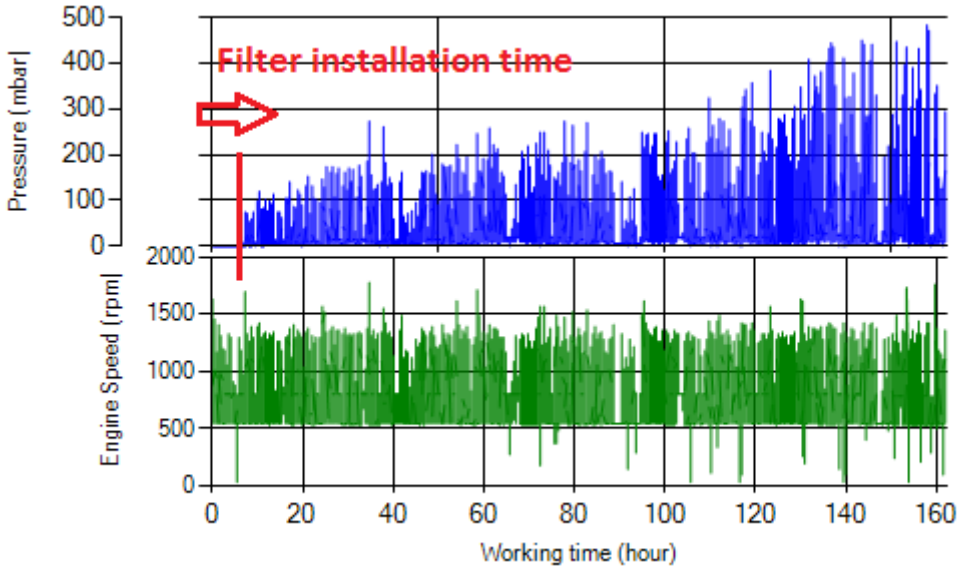


Figure 11- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

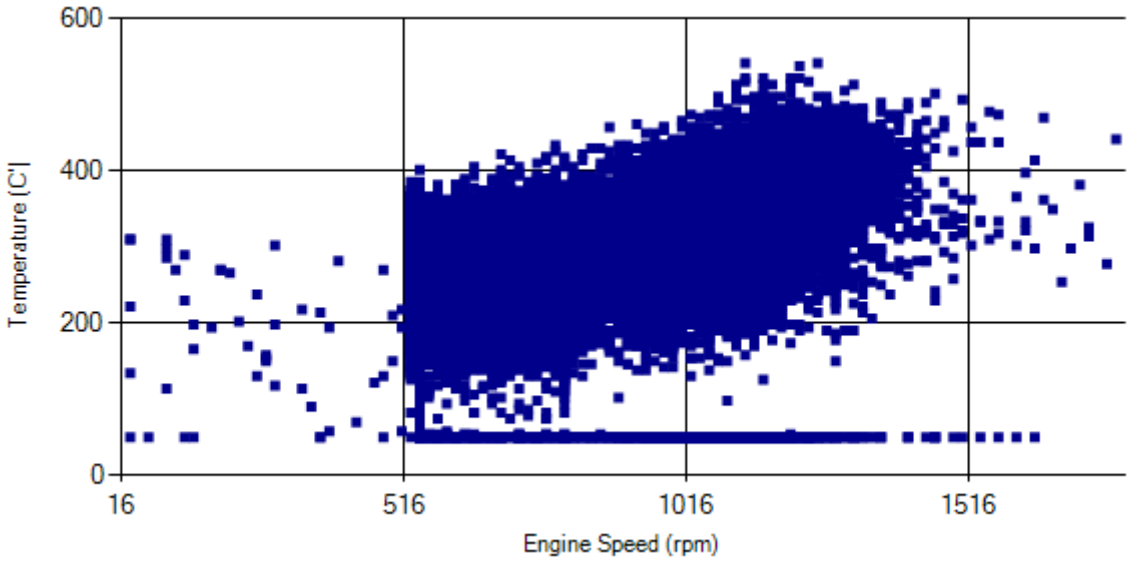


Figure 12- Temperature against engine speed

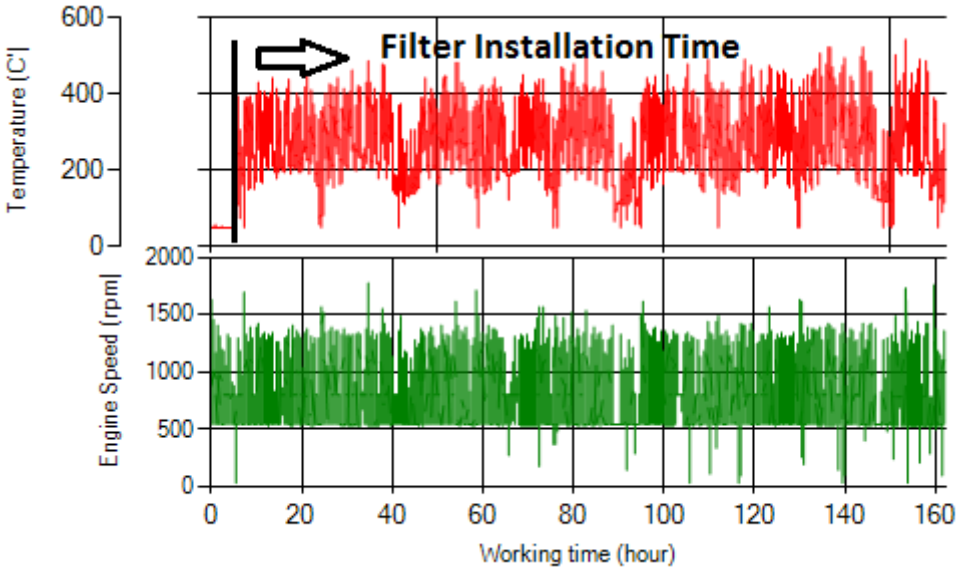


Figure 13- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 1.14% of total working time pressure is above 200 mbar and 3.26% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 3% of total working time temperature is above 400 ℃. Considering temperature distribution of this line's buses (T400<<1%), it is clear this distribution was because of high back pressure.
- According to table 7 data and considering only 9 days working from installation day and bus company's warning about engine performance, vehicle was stopped on Sep 2nd. This result was obtained from system checking on Sep 2nd and 3rd:

    1- Due to increasing back pressure engine worked at very bad mood. (abnormal engine noise)
    2- DPF was fully plugged and some black smoke was detected from joints.

- Pressure test was done on low, medium and high idle speed. Following pictures show the outcomes.

Engine Speed	Pressure
Low Idle (550 rpm)	72 mbar
Medium Idle (1000 rpm)	450 mbar
High Idle (1500 rpm)	600 mbar

Figure 14. Low Idle (N=550 rpm)

Figure 15. Medium Idle (N=1000 rpm)

Figure 16. High Idle (N=1500 rpm)

- After data analysis during period and considering final pressure test, DPF was removed and cleaned on Sep 4th.

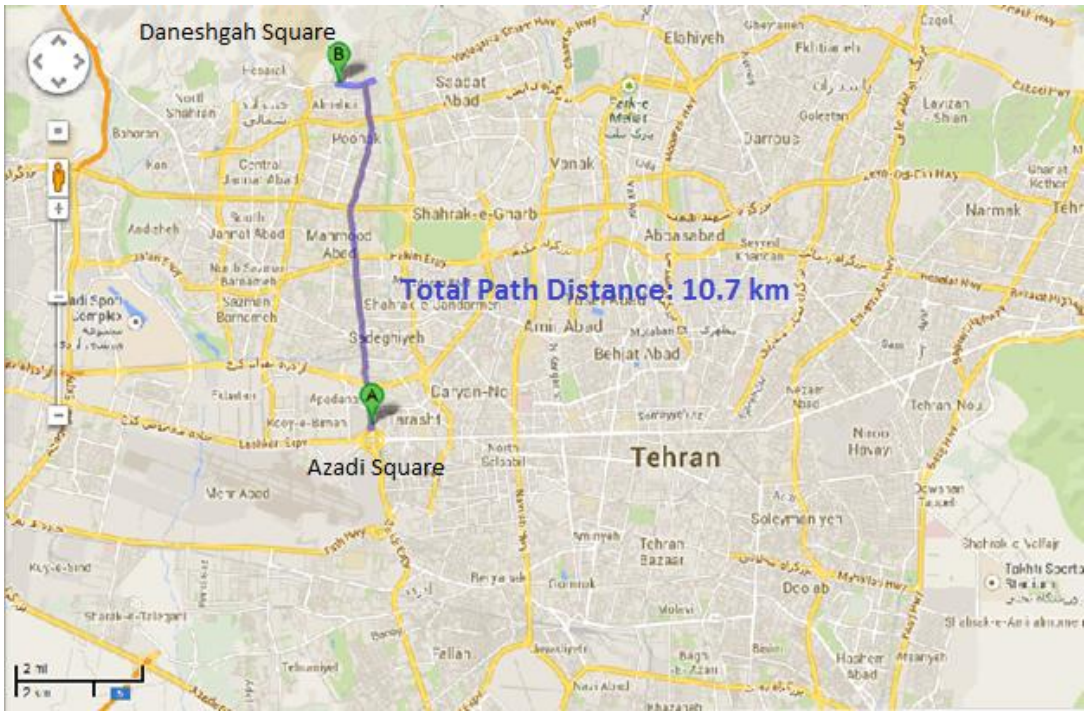
Figure 17. Before cleaning

Figure 18. After Cleaning

Filter operation status	Excellent ☐ Good ☐ Maintenance required ■ Failed☐

- **Notice:** DPF was cleaned on Sep 4th but was not installed on bus.

Vehicle plate number	85476
Bus line	Number 10 (south to north Bus line)
DPF producer company	HJS_04 (Passive system with FBC)



Overall Information

Table1- Overall Information

Vehicle plate number	85476
CPK data logger number	LN: 001508, DN: 2003, Sim +989218469624
Bus line	Number 10 (south to north Bus line)
Bus Terminals	Azadi square - Daneshgah square
Total path distance	10.7 km
DPF producer company	HJS_04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	01/Aug/2015 – 15/Aug/2015 (fifteen days)
K value - DPF upstream	1.95 [1/m]
K value – DPF downstream	0.04 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF was cleaned on 22nd Jul.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	26163 km
Bus mileage over the period	2246 km
Working days over the period	14 days
Stop days	1 days
Data logger working days	14 days
Working hours over the period	173 hours 19 minutes
Average working hours per day (including stop days)	11 hours 33 minutes
Bus average speed	12.95 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1445 lit
Fuel consumption per hour	8.33 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	0.607 lit
Average additive consumption	270 cc/km
Additive consumption to fuel ration	420 cc per 1000 lit (batch dosing with tank level)

Notice: RPM sensor got problem on Aug 2nd and was fixed on Aug 15th. So during this period engine speed and its related data and diagrams are unreliable.

Temperature, Pressure and Engine Speed Overview

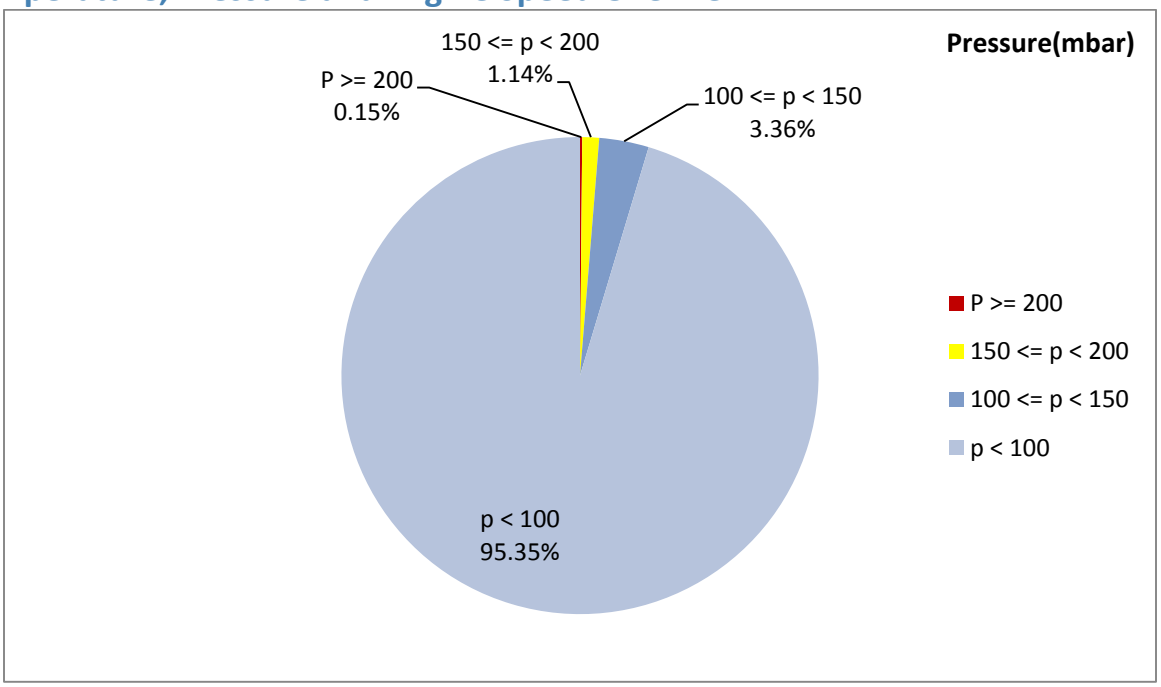


Figure 1- Pressure distribution over the working hours

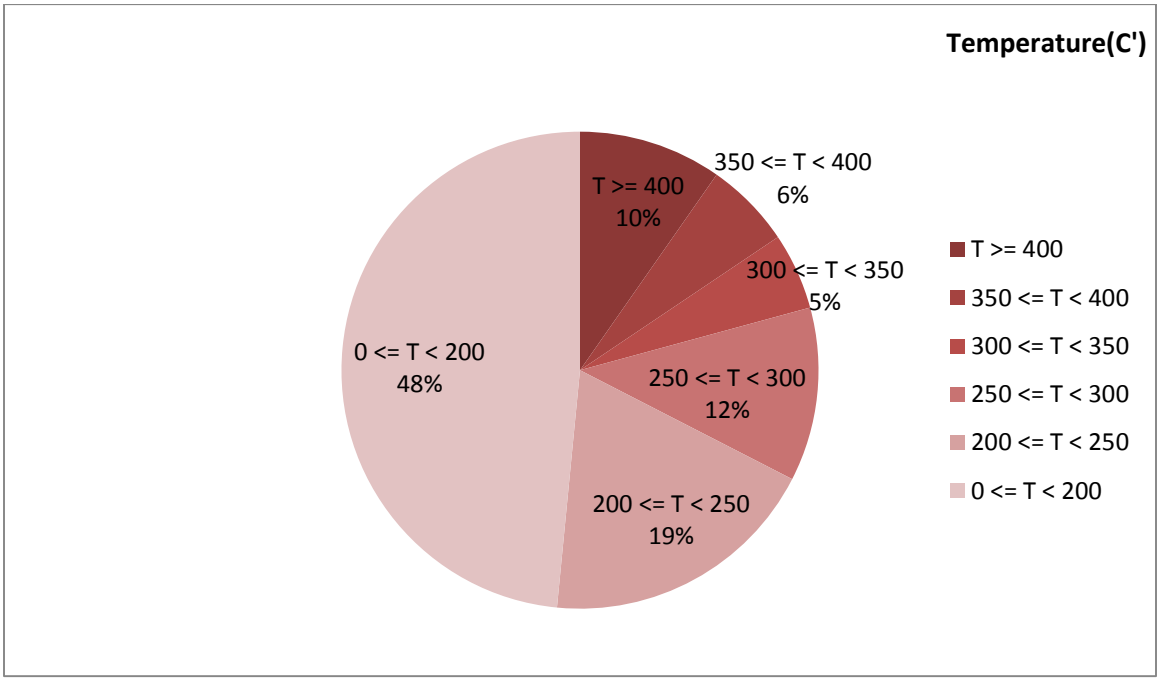


Figure 2-Temperature distribution over the working hours

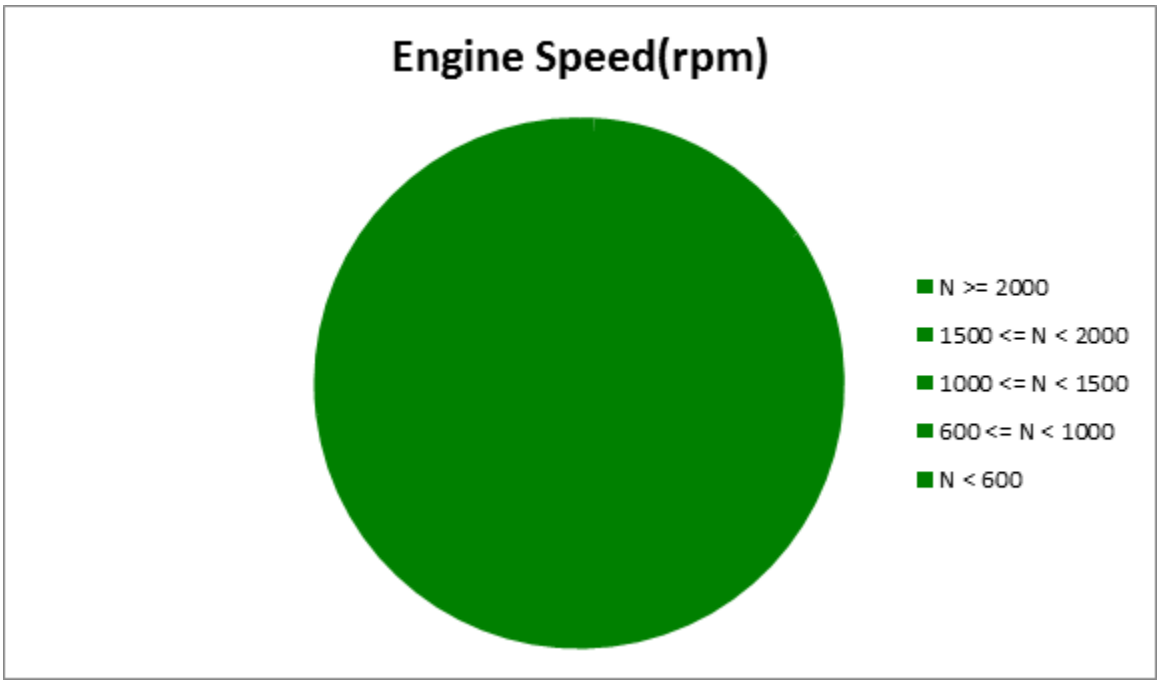


Figure 3- Engine speed distribution over the working hours

Notice: RPM sensor got problem on Aug 2nd and was fixed on Aug 15th. So during this period engine speed and its related data and diagrams are unreliable.

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
228.68	22.13	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
-	-	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
554-50	240-0	-

Detailed Pressure Analysis

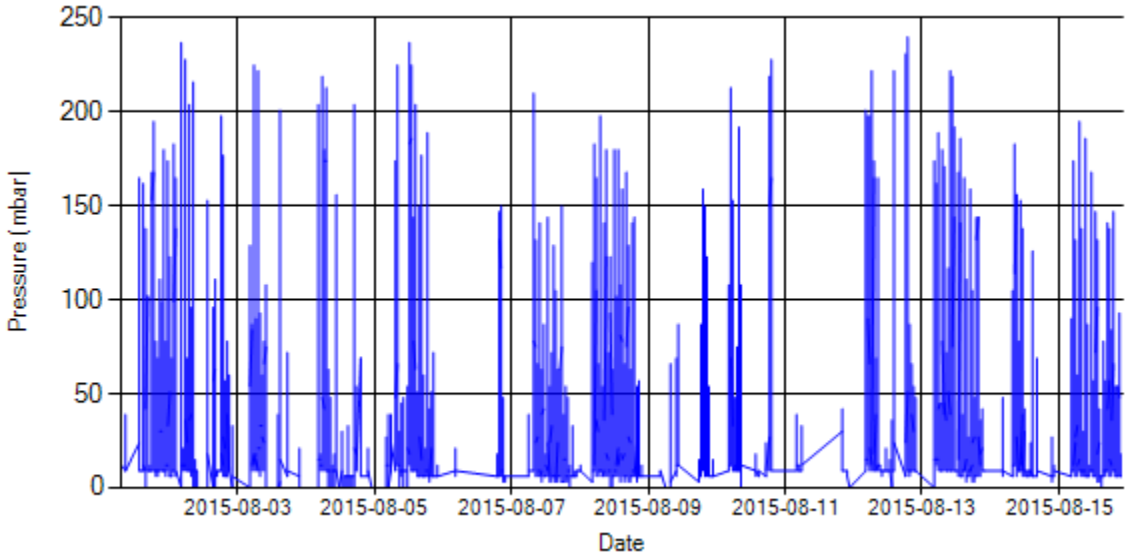


Figure 4- Pressure distribution over the period

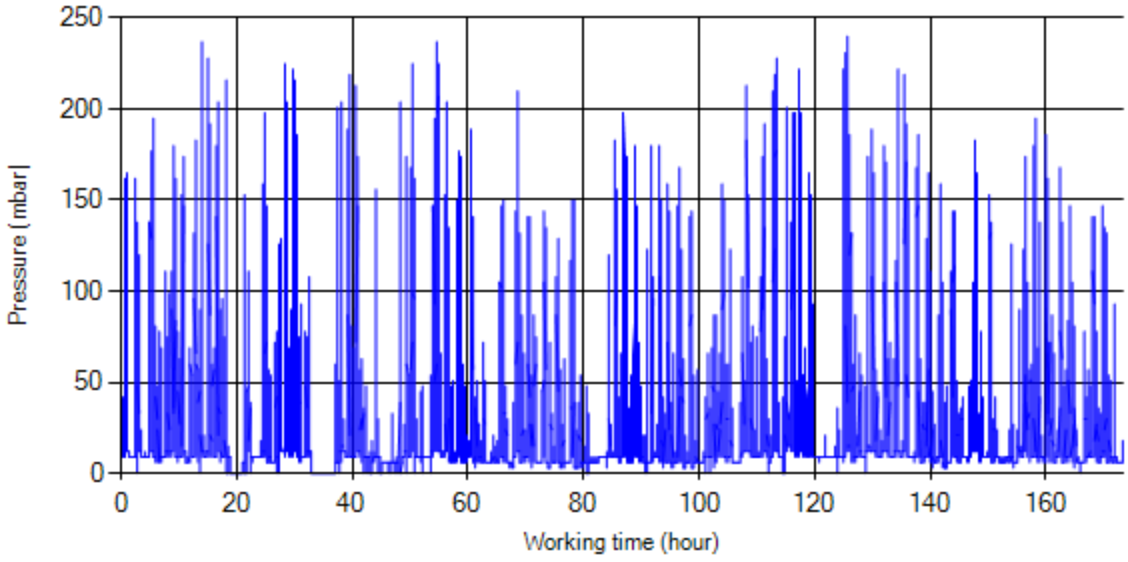


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

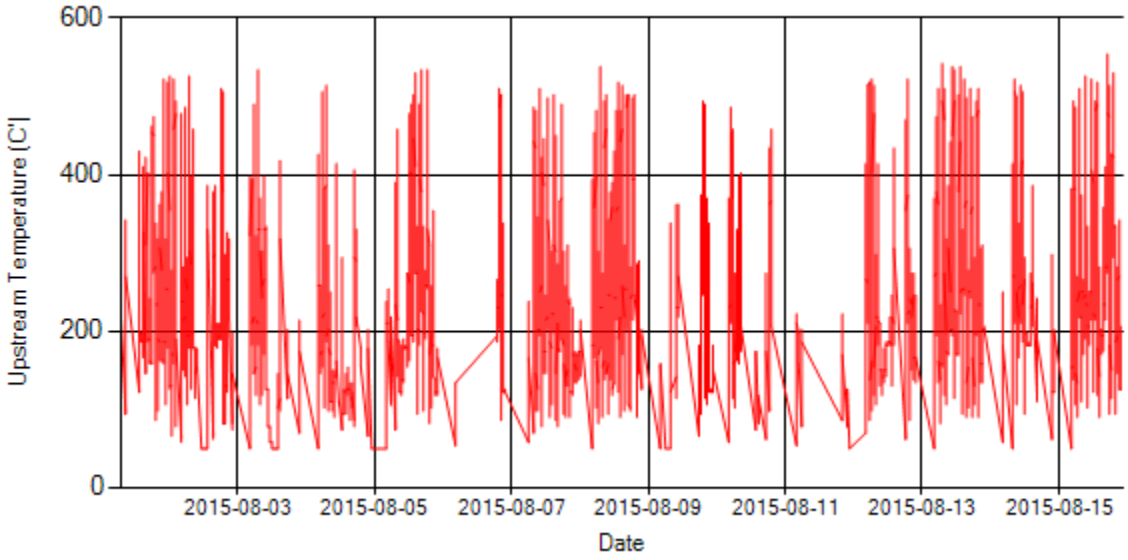


Figure 6- Temperature distribution over the period

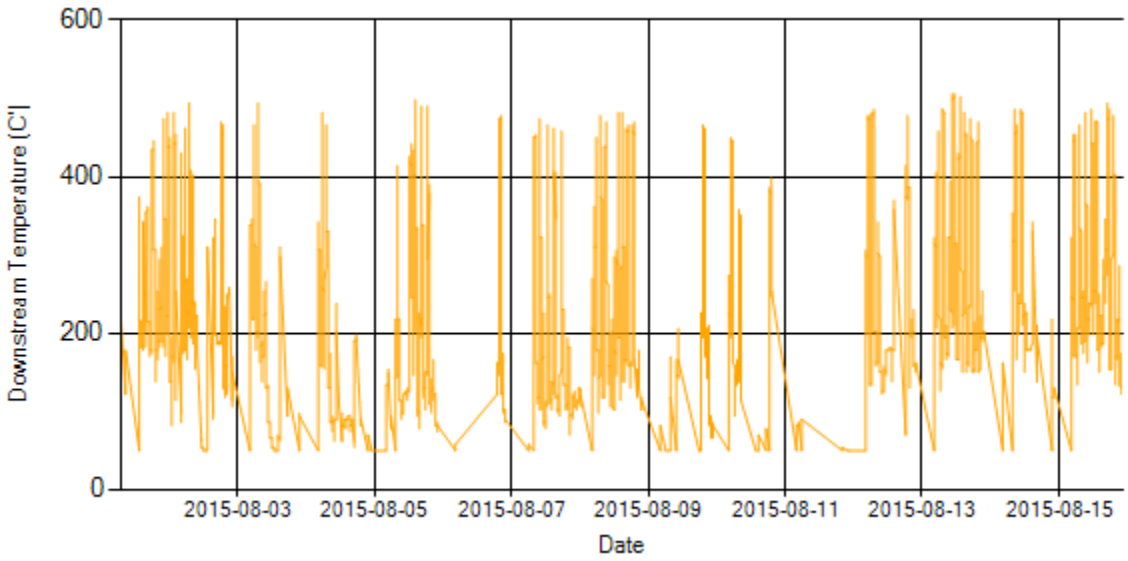


Figure 7- Temperature distribution over the period

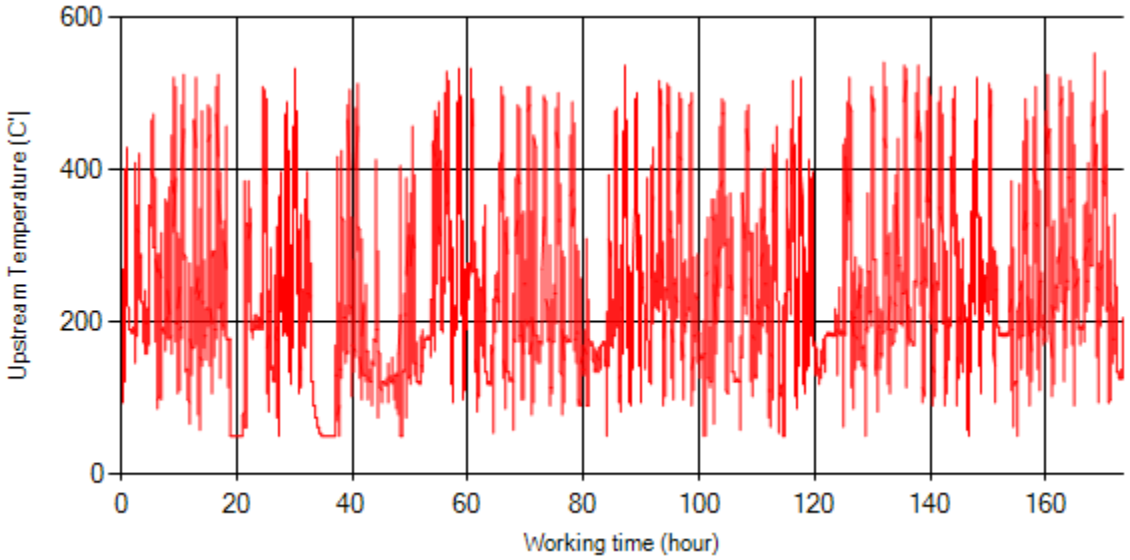


Figure 8- Temperature vs. working hours

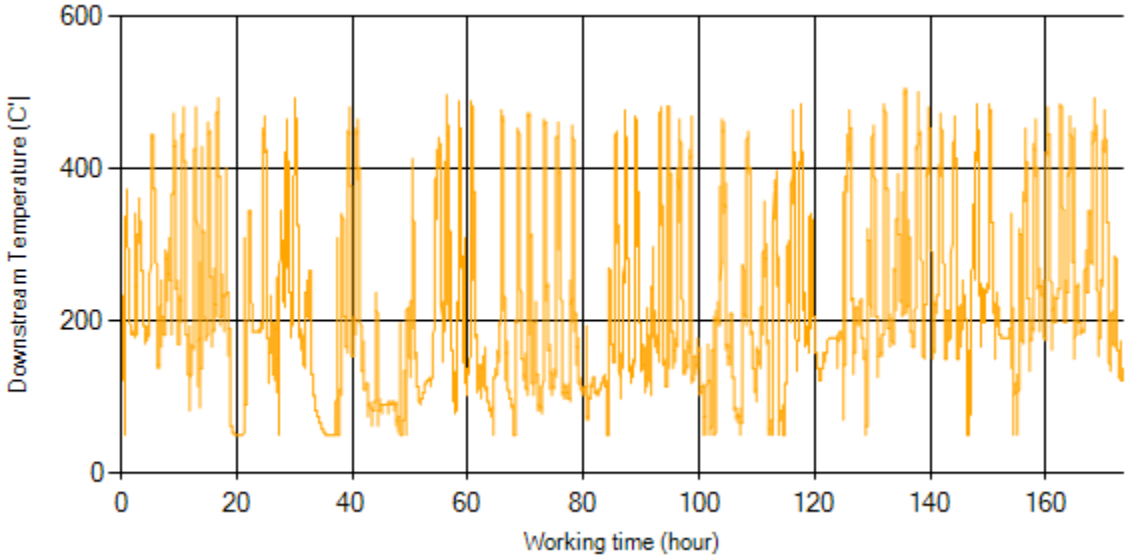


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

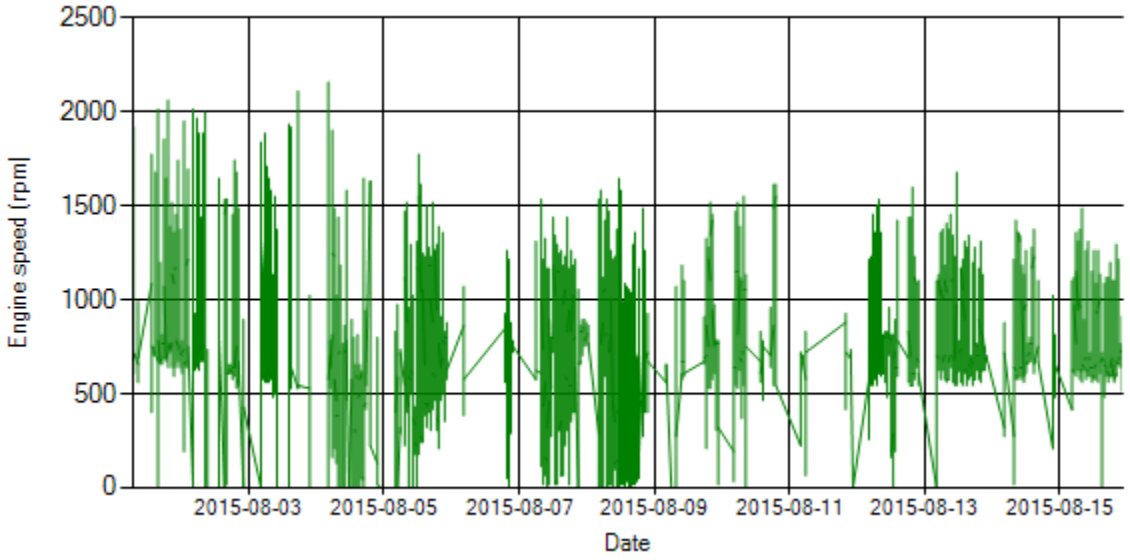


Figure 10- Engine speed distribution over the period

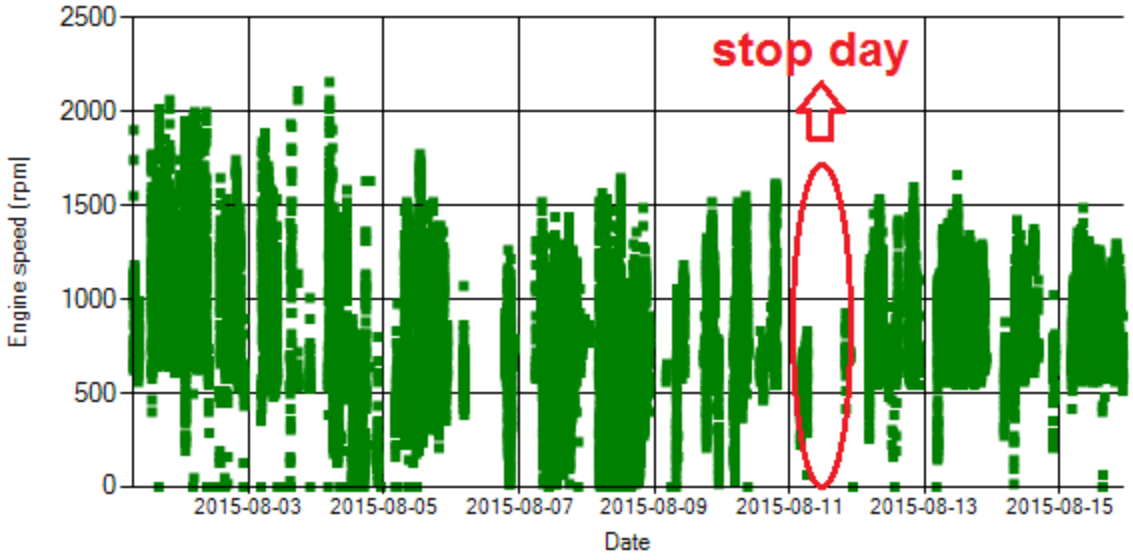


Figure 11- Engine speed diagram for calculating CPK's working days

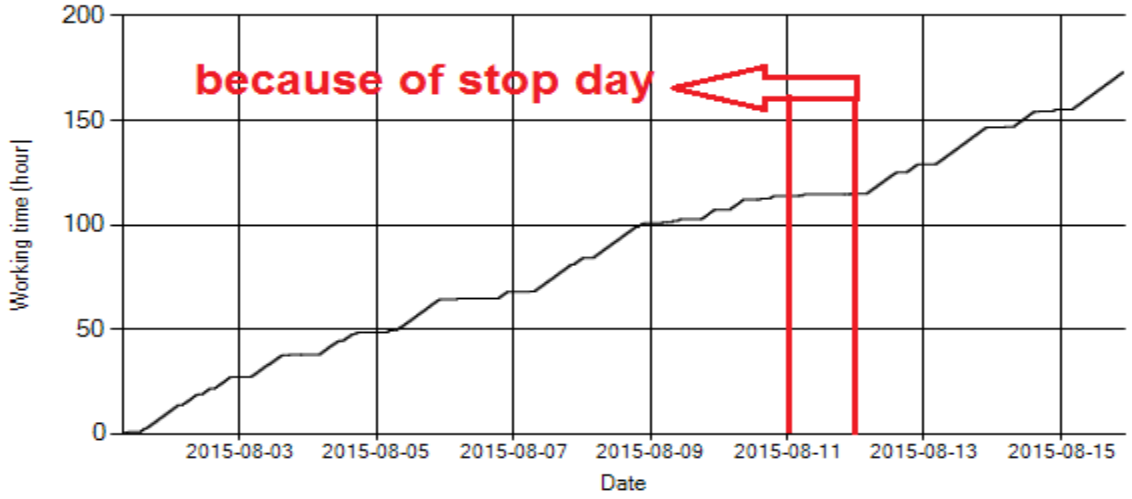


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data.

Pressure-Engine Speed diagrams

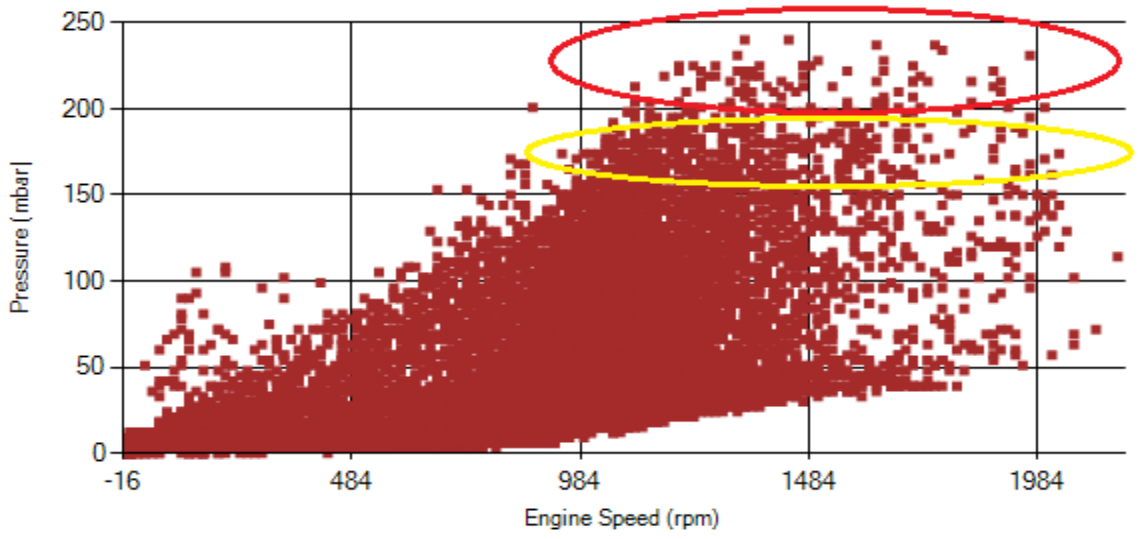


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

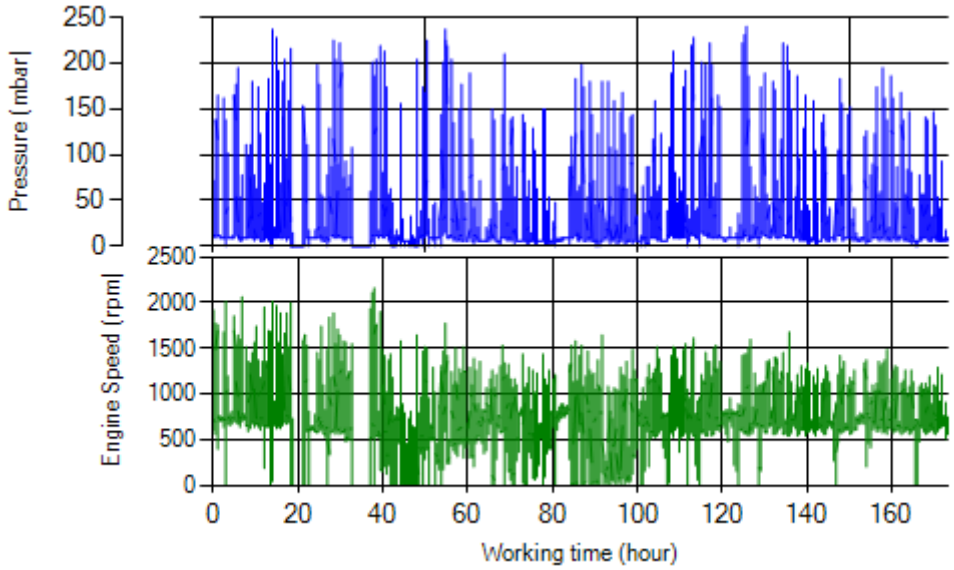


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

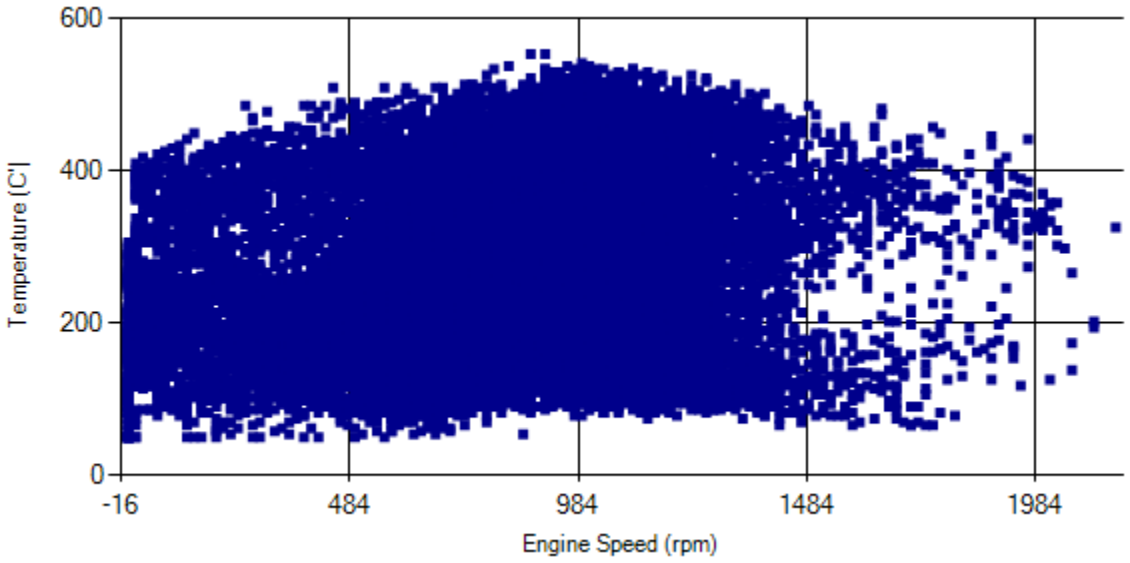


Figure 15- Temperature against engine speed

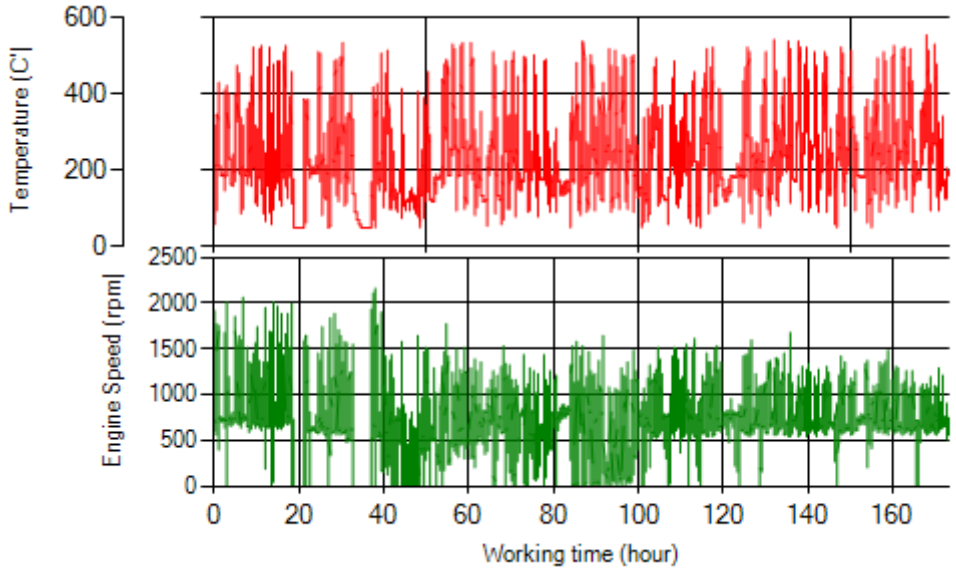


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.15% of total working time pressure is above 200 mbar and 1.39% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 10% of total working-time temperature is above 400 ℃ and 26% above 350℃.

Filter operation status	Excellent ☐	Good ■
	Maintenance required ☐	Failed☐

Overall Information

Table1- Overall Information

Vehicle plate number	85476
CPK data logger number	LN: 001508, DN: 2003, Sim +989218469624
Bus line	Number 10 (south to north Bus line)
Bus Terminals	Azadi square - Daneshgah square
Total path distance	10.7 km
DPF producer company	HJS_04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	16/Aug/2015 – 31/Aug/2015 (sixteen days)
K value - DPF upstream	1.95 [1/m]
K value – DPF downstream	0.04 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF was cleaned on 22nd Jul.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	29132 km
Bus mileage over the period	2969 km
Working days over the period	15 days
Stop days	1 day
Data logger working days	15 days
Working hours over the period	222 hours 23 minutes
Average working hours per day (including stop days)	13 hours 54 minutes
Bus average speed	13.35 km/hr
idle speed time to all working time ration	58.03 %
Total Bus fuel consumption over the period	1905 lit
Fuel consumption per hour	8.57 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	0.800 lit
Average additive consumption	269 cc/km
Additive consumption to fuel ration	420 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

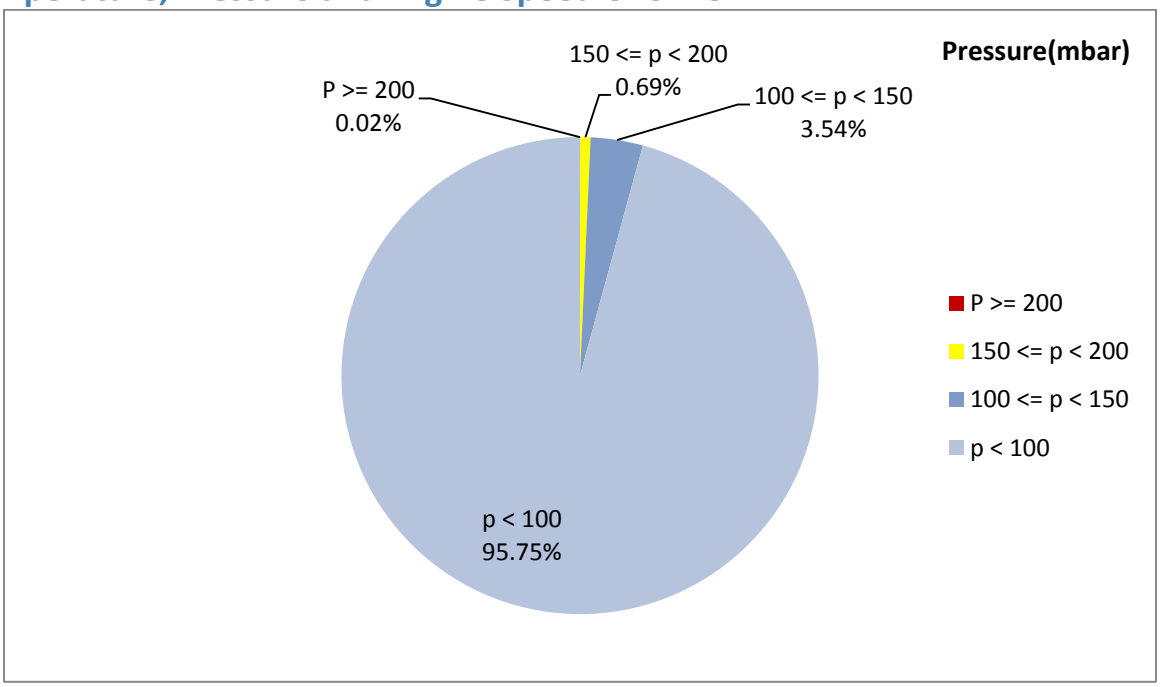


Figure 1- Pressure distribution over the working hours

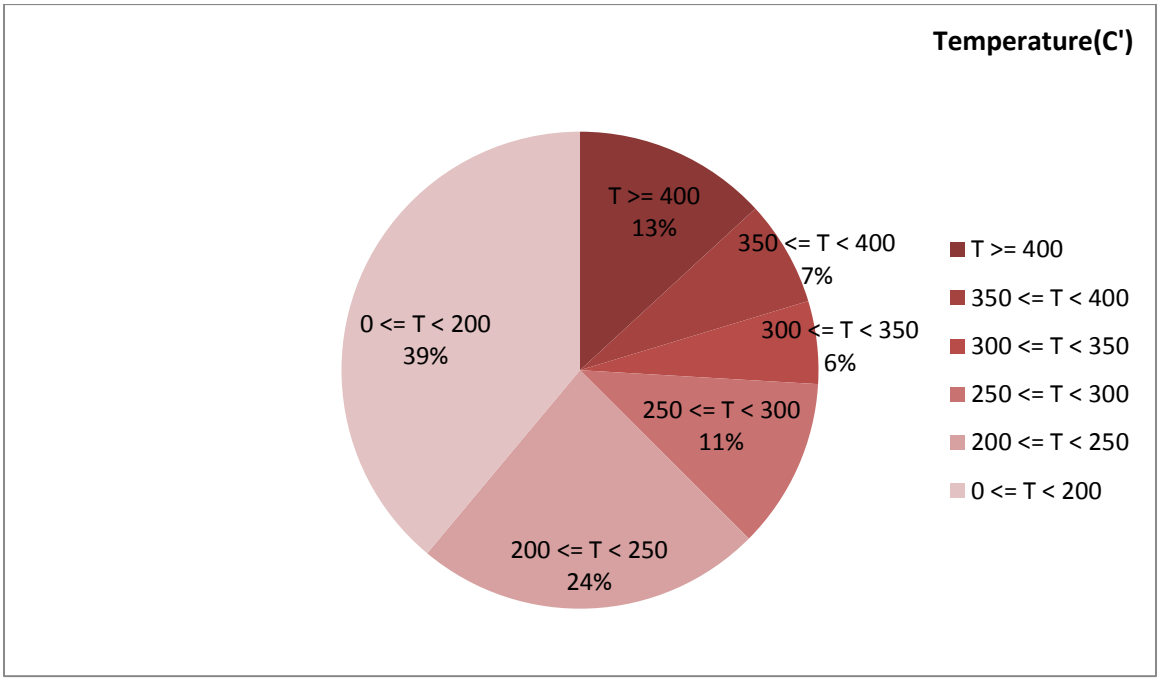


Figure 2-Temperature distribution over the working hours

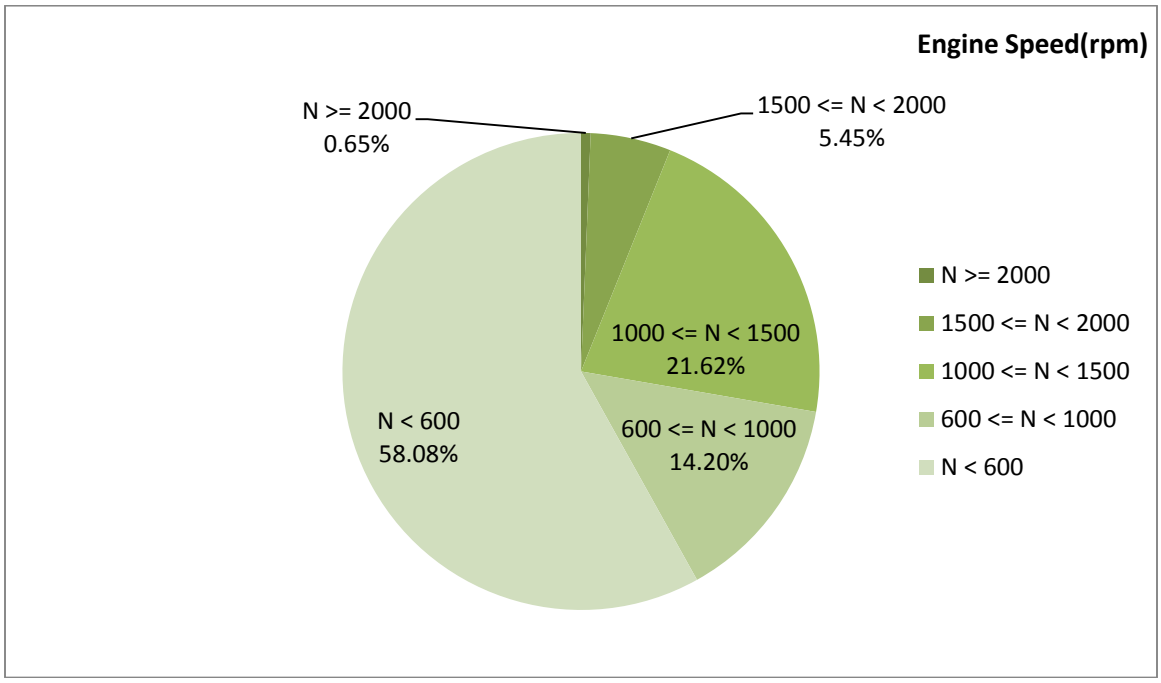


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
248.9	23.29	816

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
304.28	43.69	1148

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
550-50	216-0	2544-256

Detailed Pressure Analysis

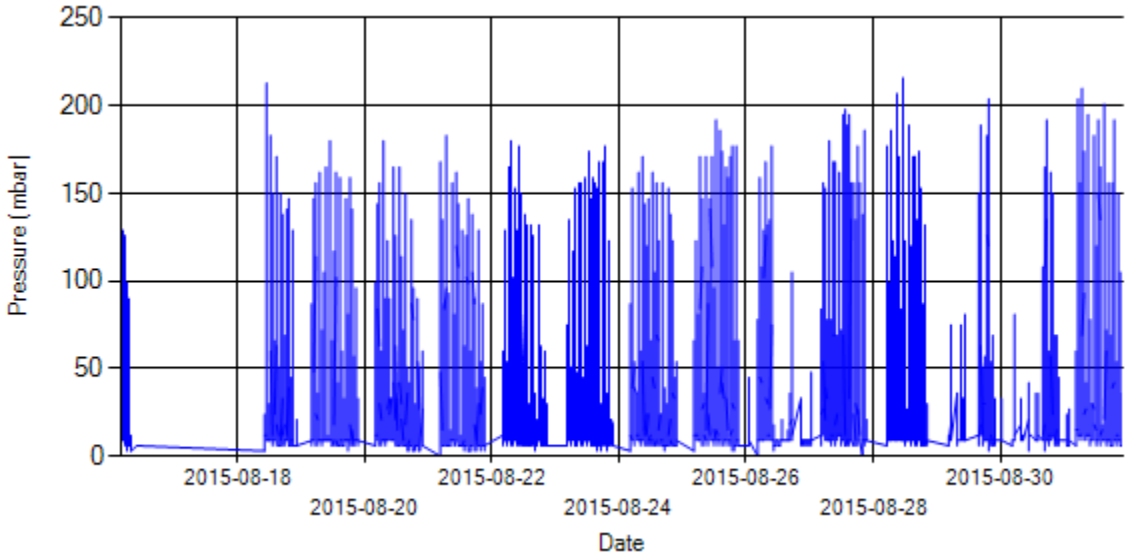


Figure 4- Pressure distribution over the period

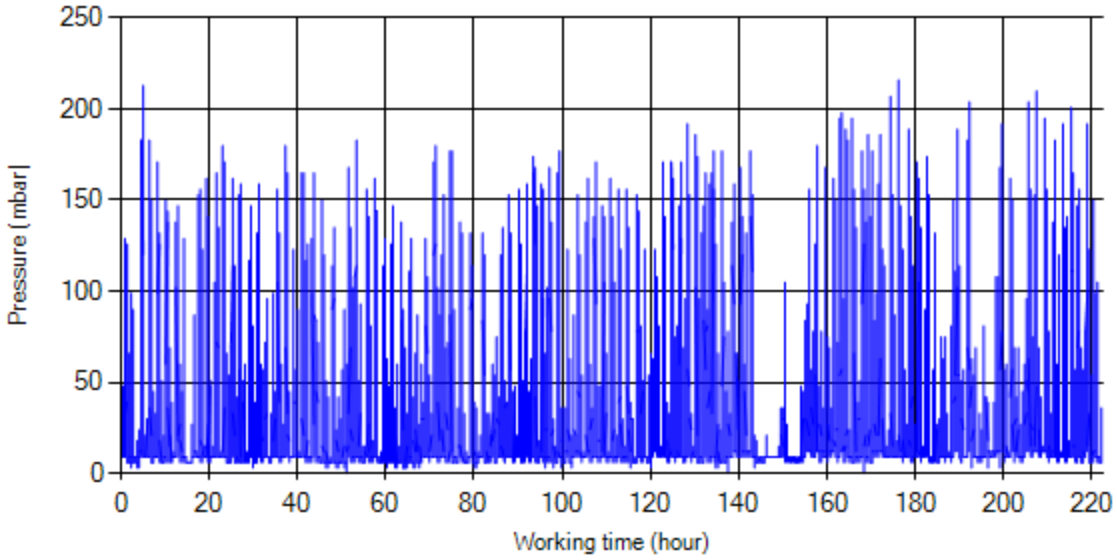


Figure 5- Pressure vs. working hours

Notice: backpressure distribution was shown into two diagrams. As obvious in figure 5, stop-working periods were eliminated and pressure was displayed along working hours.

Detailed Temperature Analysis

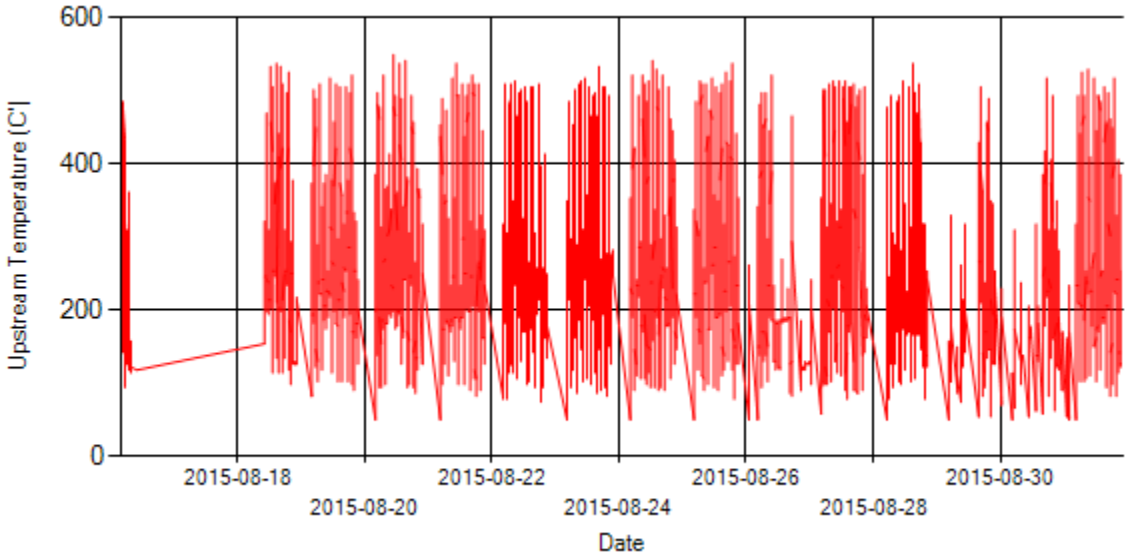


Figure 6- Temperature distribution over the period

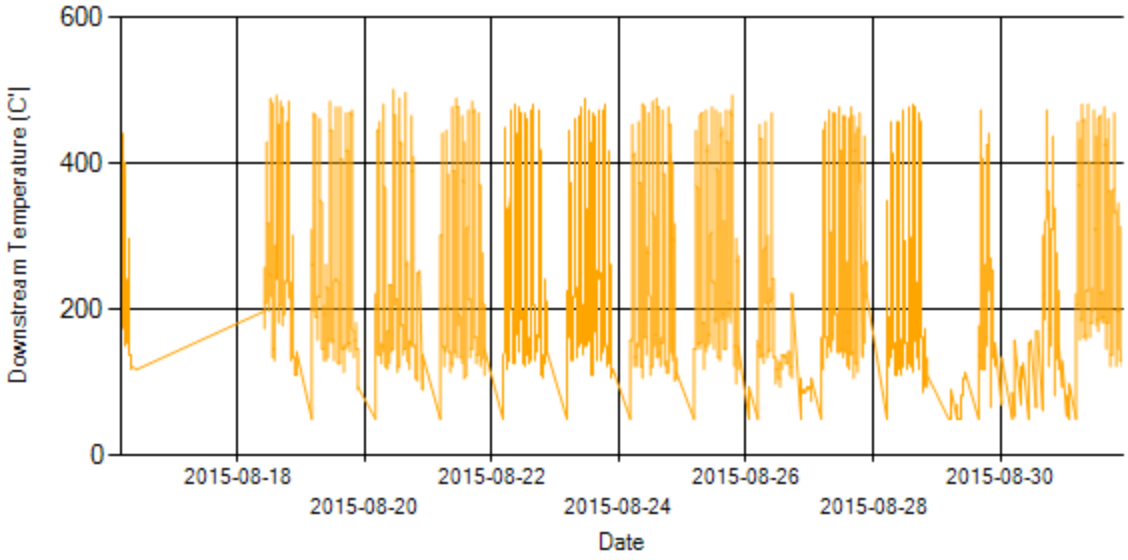


Figure 7- Temperature distribution over the period

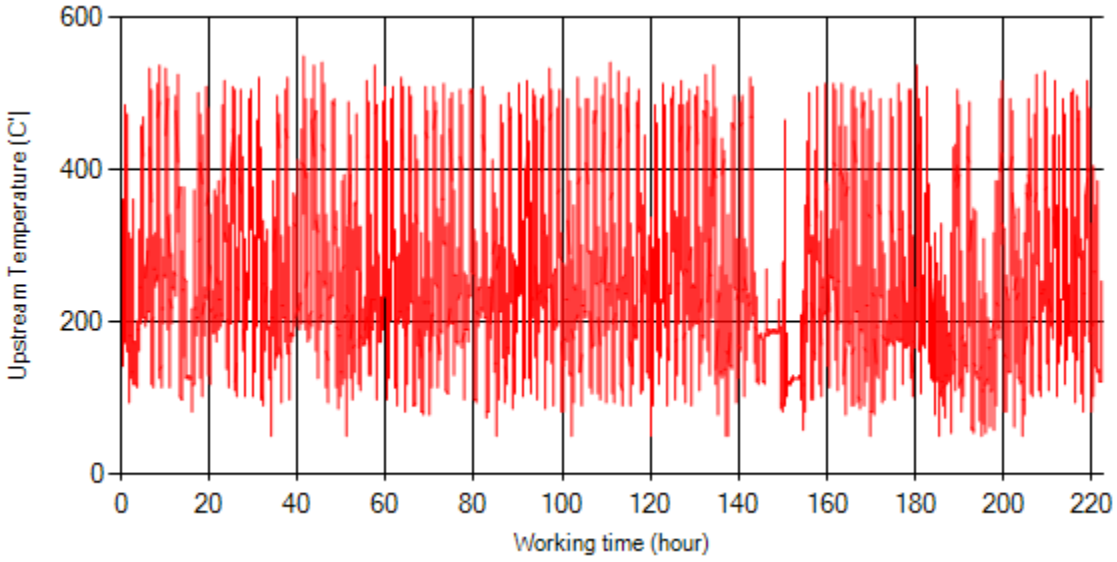


Figure 8- Temperature vs. working hours

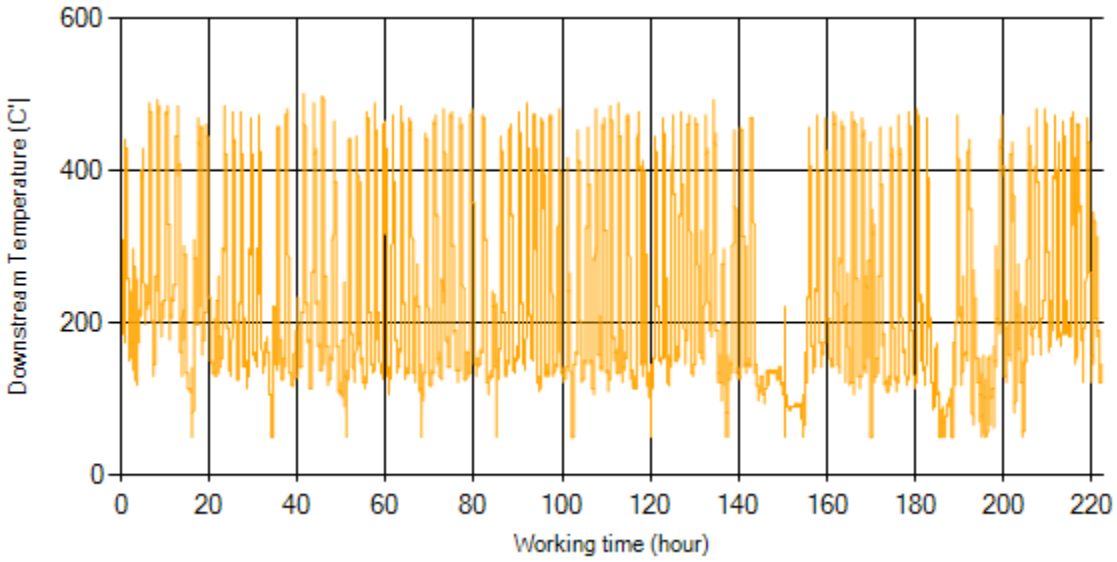


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

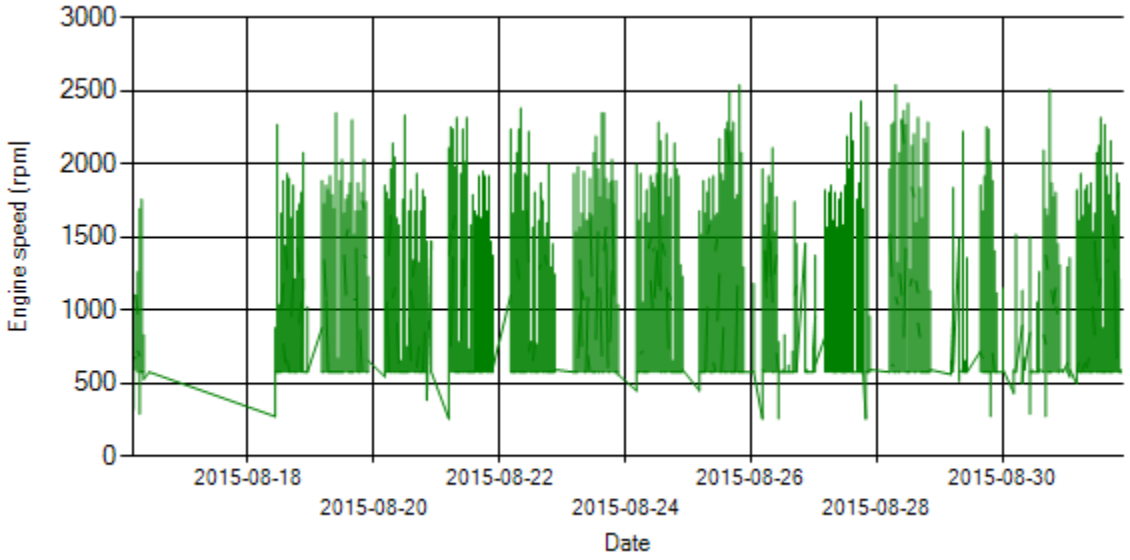


Figure 10- Engine speed distribution over the period

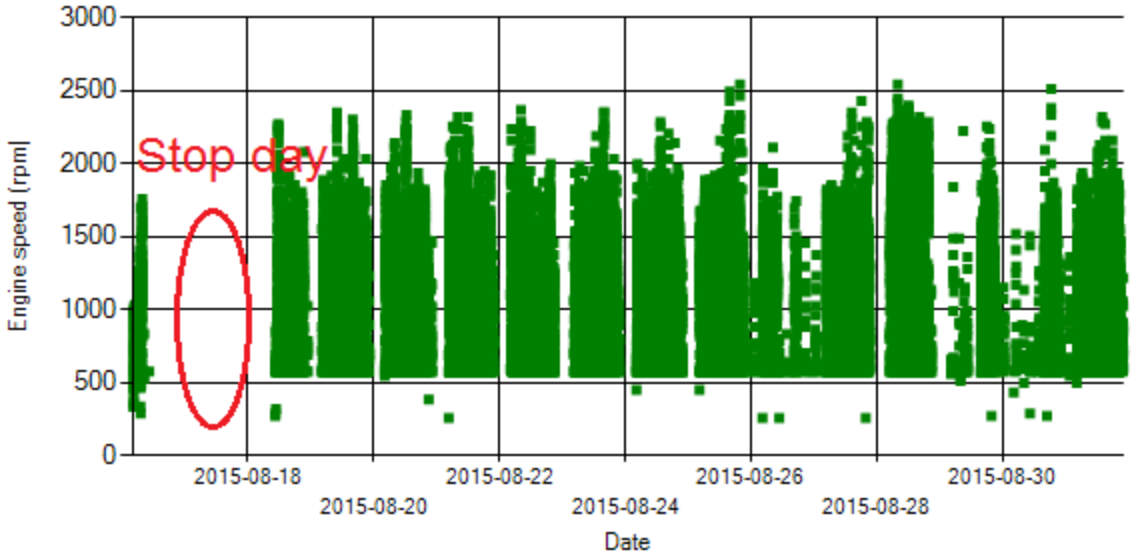


Figure 11- Engine speed diagram for calculating CPK's working days

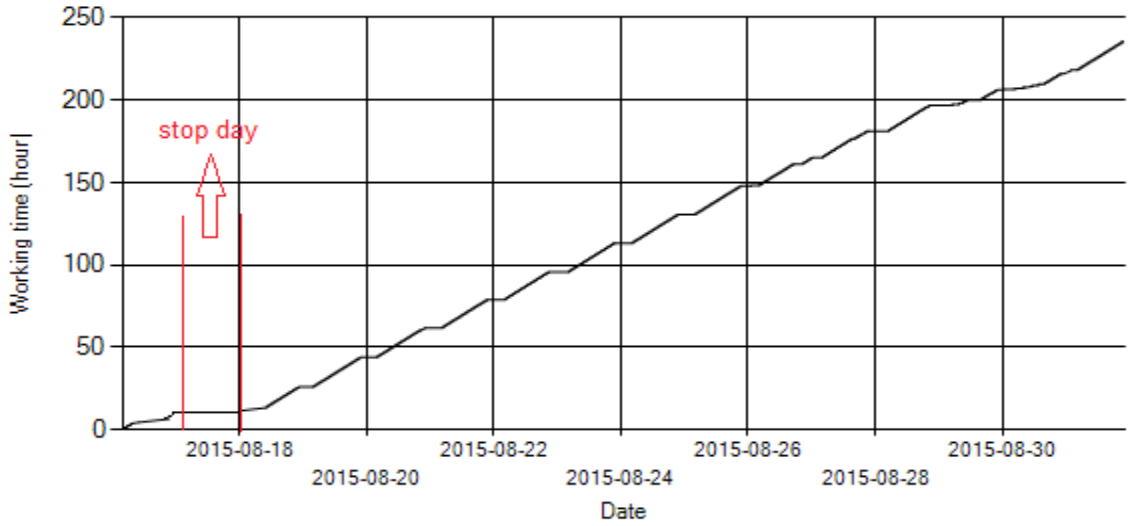


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data.

Pressure-Engine Speed diagrams

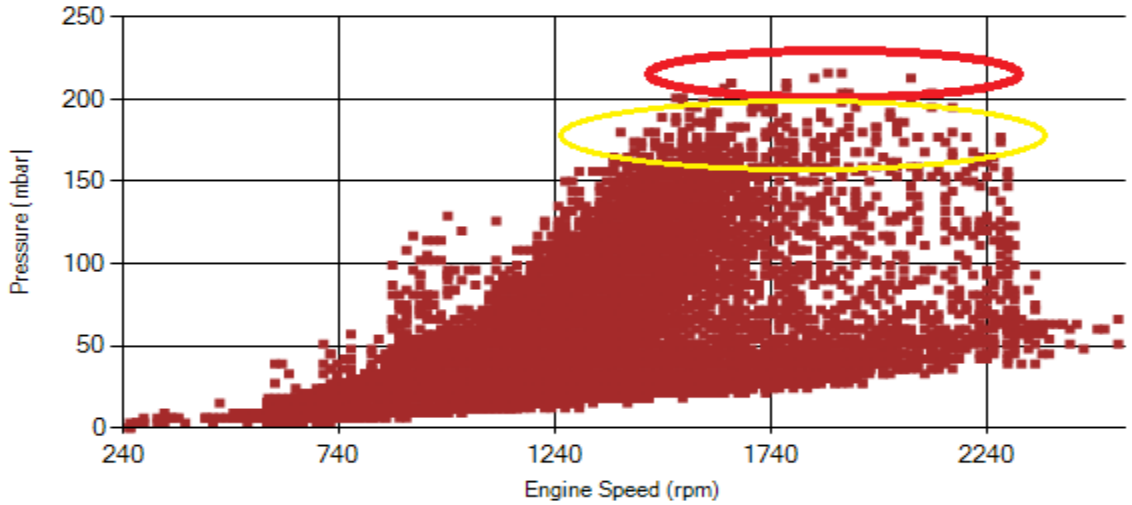


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13.

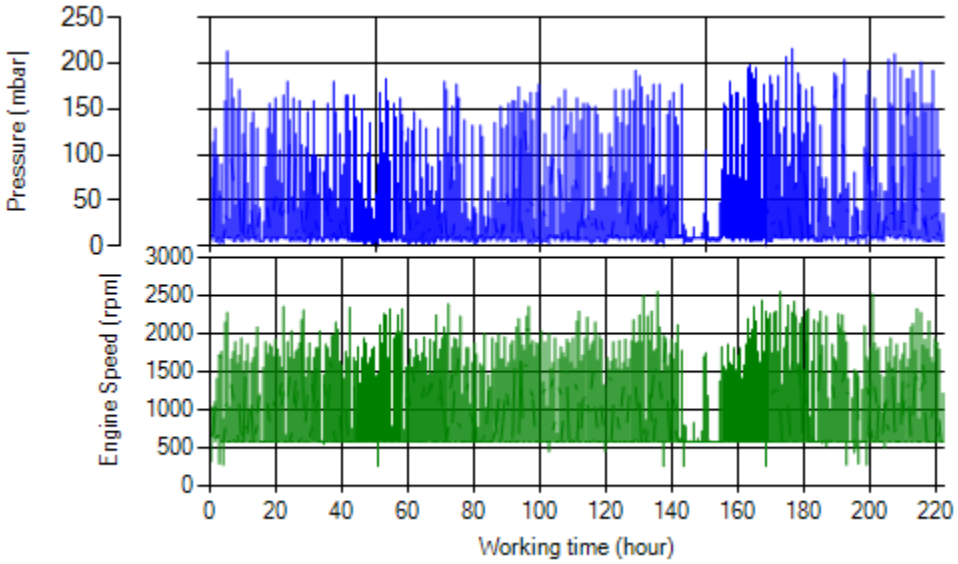


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

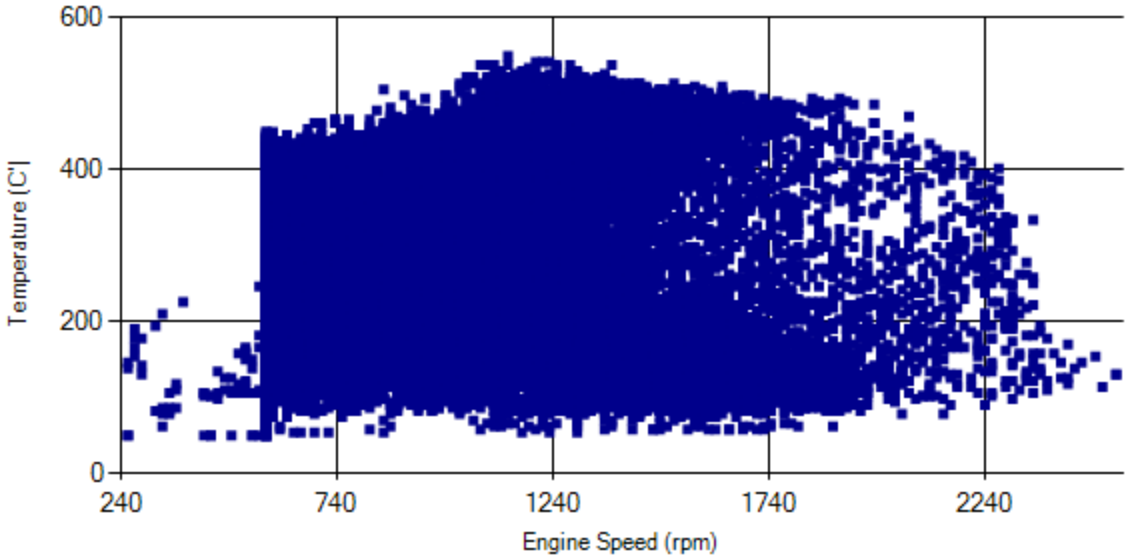


Figure 15- Temperature against engine speed

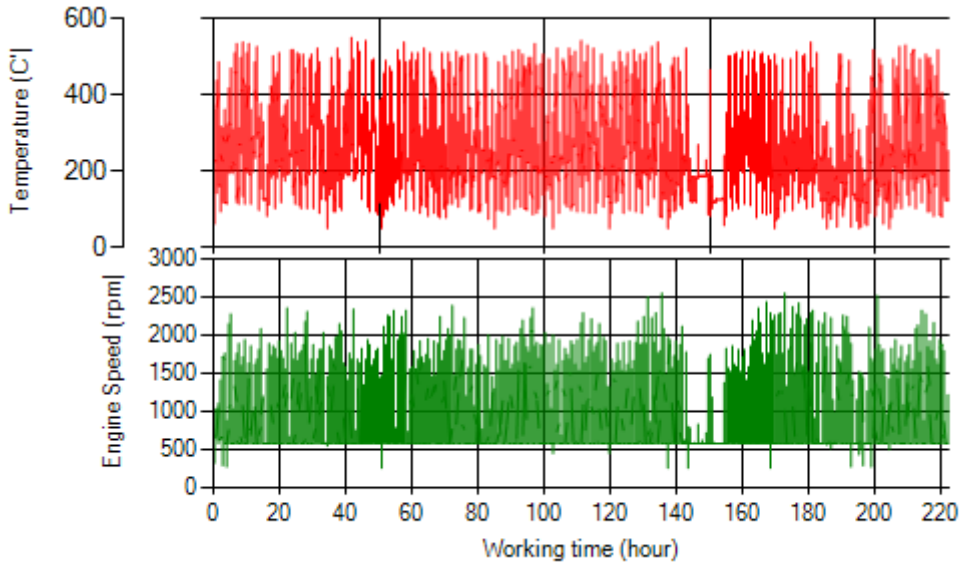


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.02% of total working time pressure is above 200 mbar and 0.71% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 13% of total working-time temperature is above 400 ℃ and 20% above 350℃.

Filter operation status	Excellent ■ Good ☐ Maintenance required ☐ Failed☐

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