DPF FEASIBLITY STUDY REPORT

TEHRAN-IRAN

DPFs' Monthly Operation Report

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

Documents Number: DPF2015071/1, DPF215072/1

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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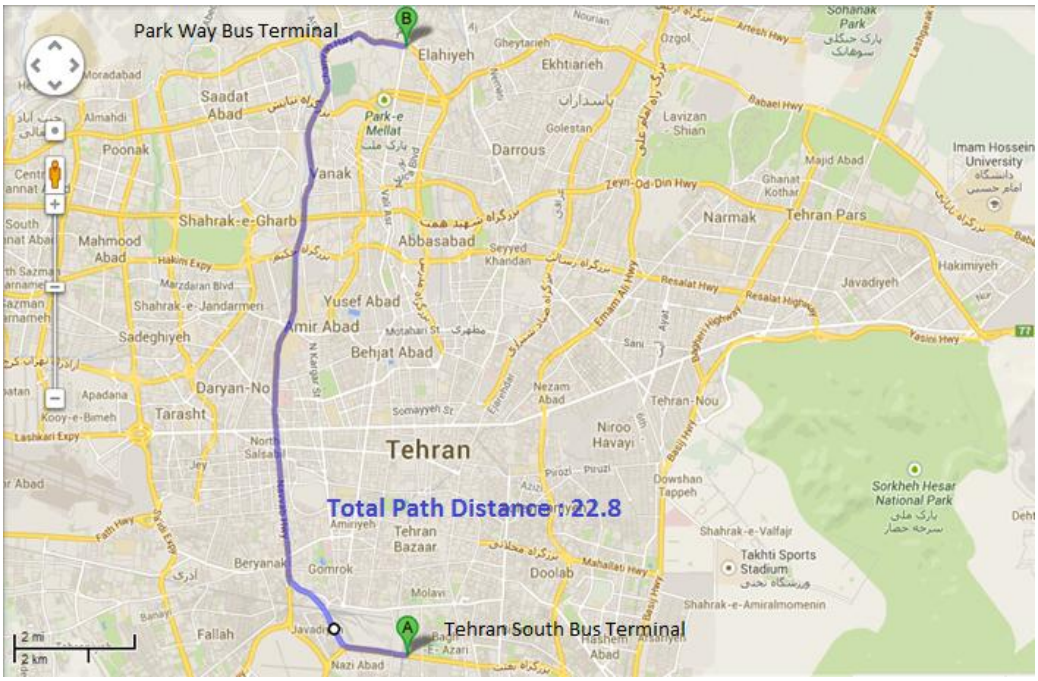
AZMOON SANAT ARVIN	Document Numbers: DPF2015071/1 DPF2015072/1

DPFs' Operation Results Overview

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

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	$P200 > 3\%$
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/Jul/2015 – 15/Jul/2015 (fifteen days)
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.04 [1/m]

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)	44191 km
Bus mileage over the period	1990 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	166 hours 57 minutes
Average working hours per day (including stop days)	11 hours 7 minutes
Bus average speed	11.92 km/hr
Idle speed time to all working time ration	52 %*
Total Bus fuel consumption over the period	1270 lit
Fuel consumption per hour	7.61 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	0.536 lit
Average additive consumption	270 cc/km
Additive consumption to fuel ration	422 cc per 1000 lit (batch dosing with tank level)

*Engine rotational speed for this vehicle when air conditioning system is on, is approximately 800 rpm and without use of cooling system is about 544 rpm.

Temperature, Pressure and Engine Speed Overview

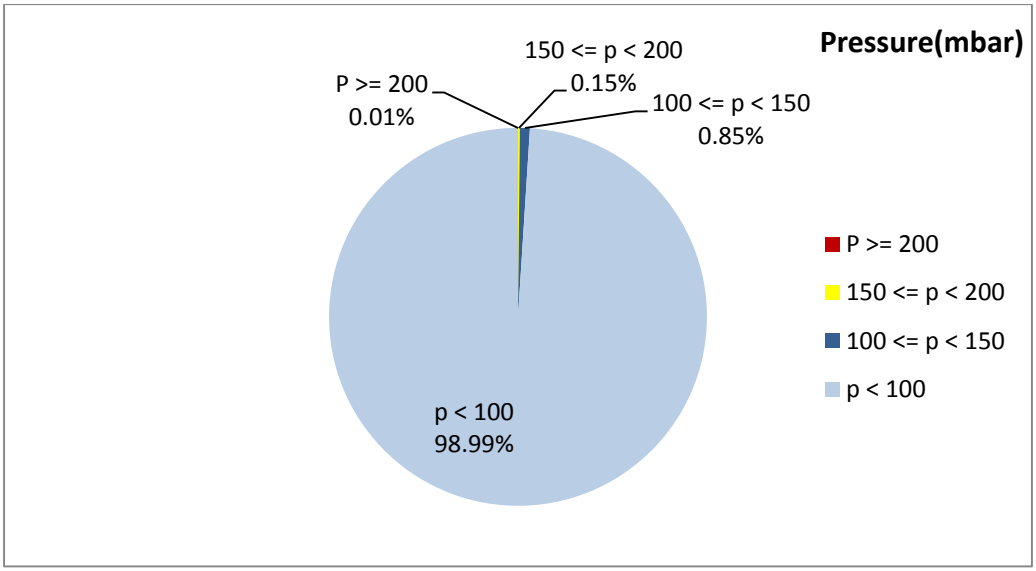


Figure 1- Pressure distribution over the working hours

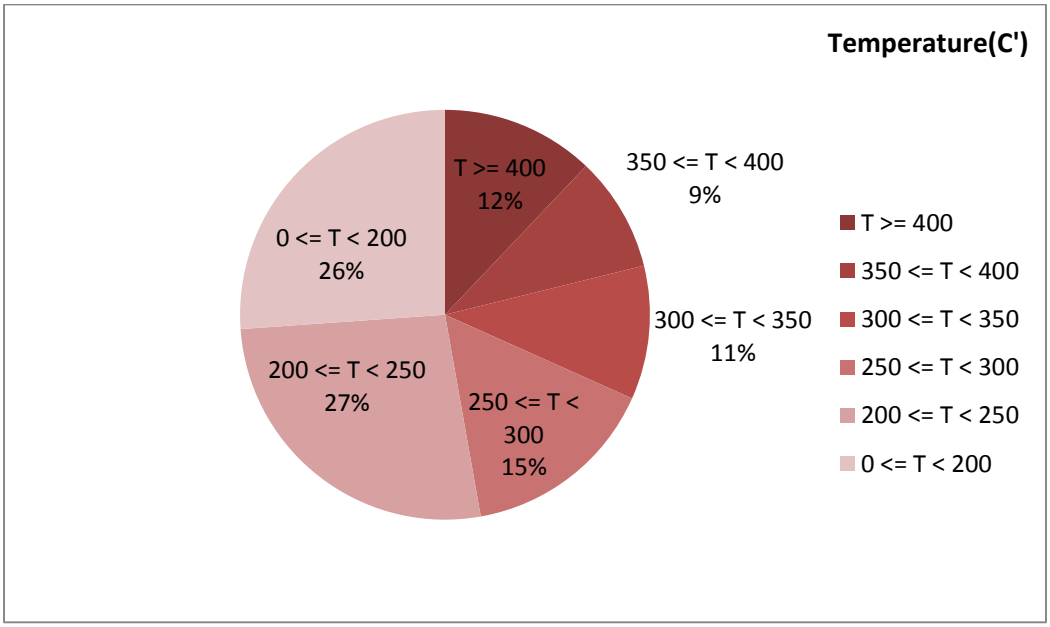


Figure 2-Temperature distribution over the working hours

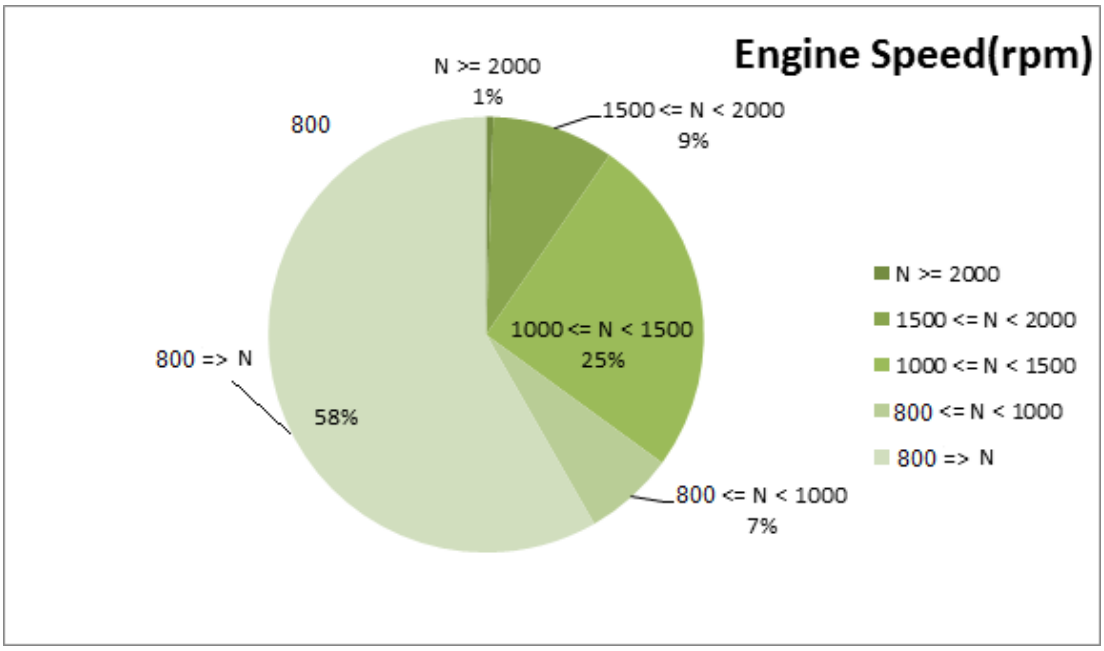


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
266.05	14.07	925

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
313.23	23.75	1154

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
718-50	204-0	2192-250

Detailed Pressure Analysis

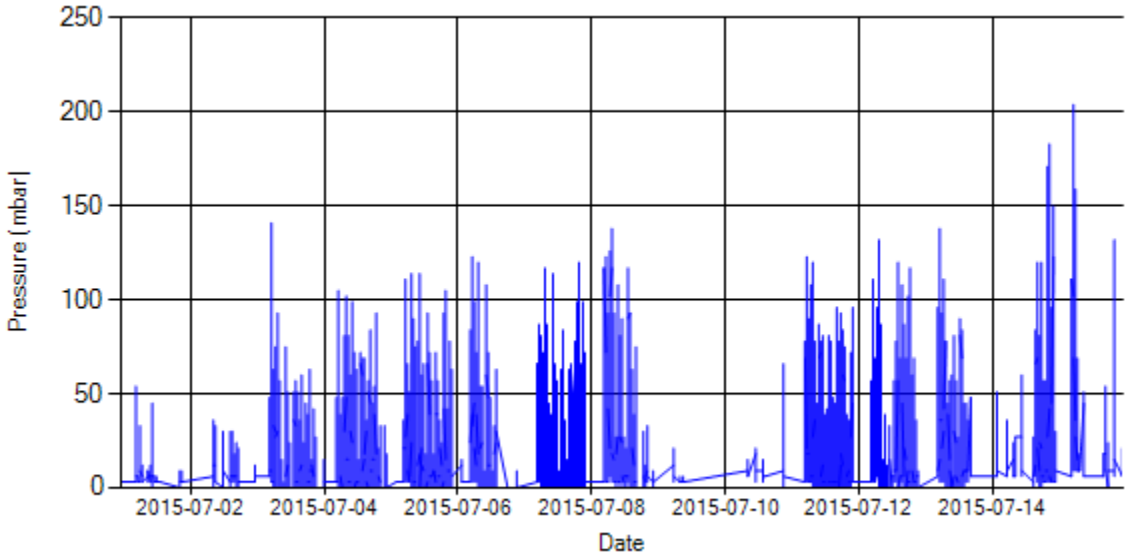


Figure 4- Pressure distribution over the period

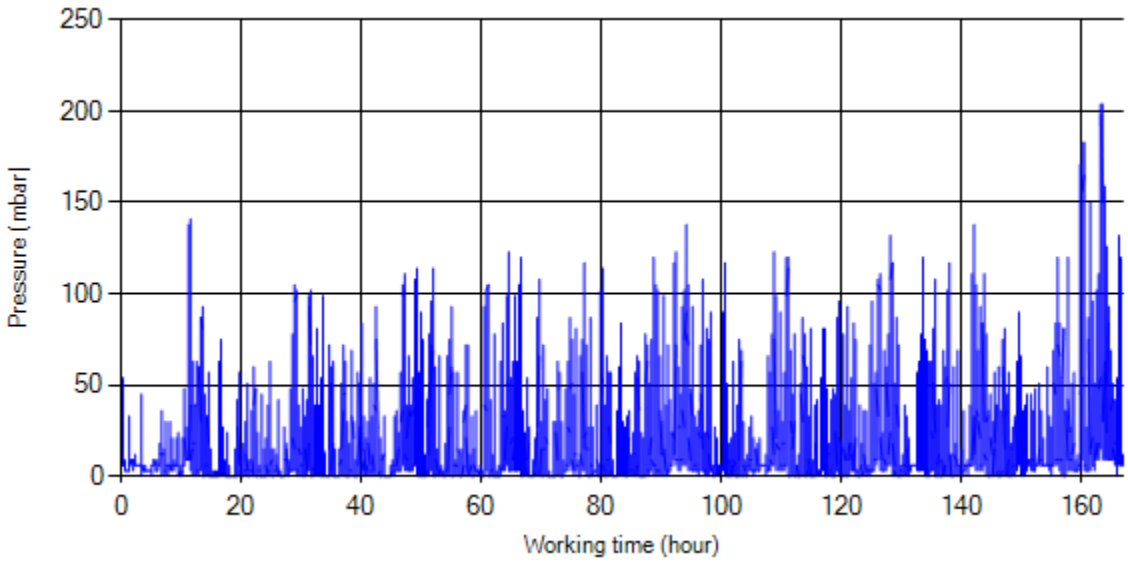


Figure 5- Pressure vs. working hours

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

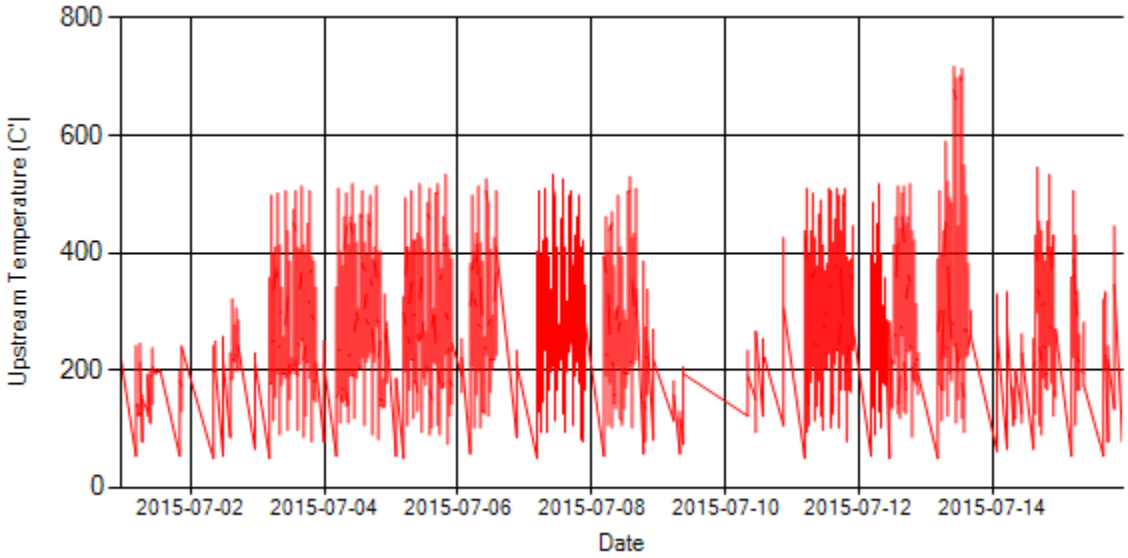


Figure 6- Temperature distribution over the period

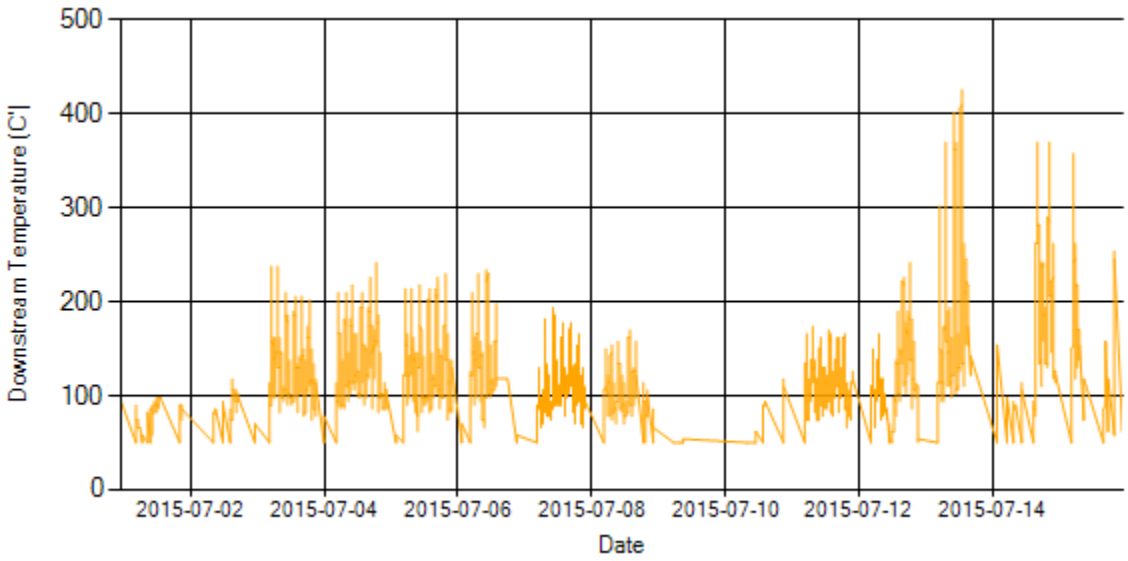


Figure 7- Temperature distribution over the period

Notice: DPF downstream temperature sensor got problem during this period and was showing low and unreasonable values.

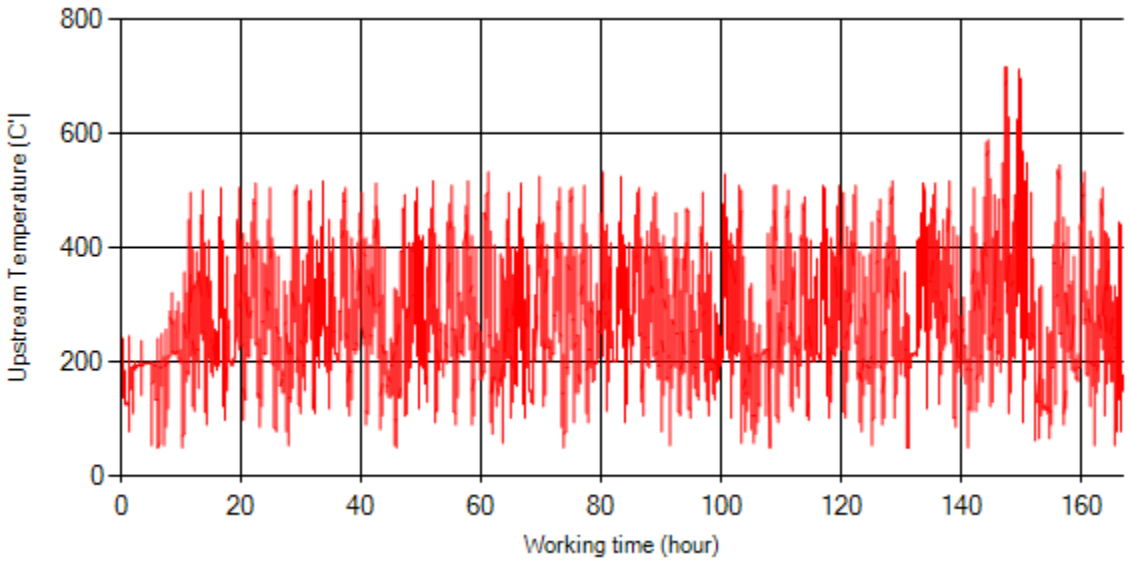


Figure 8- Temperature vs. working hours

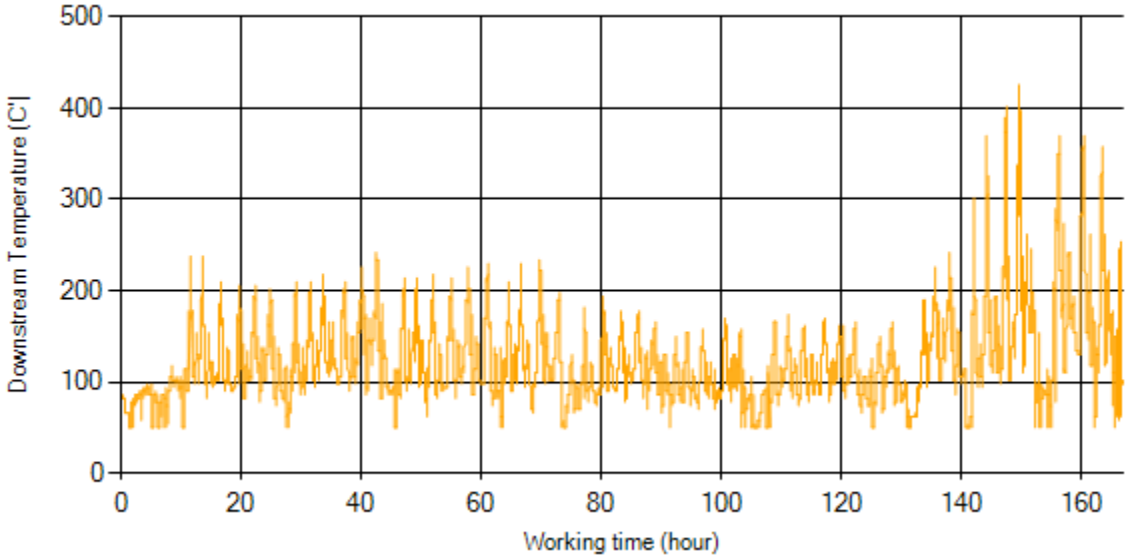


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

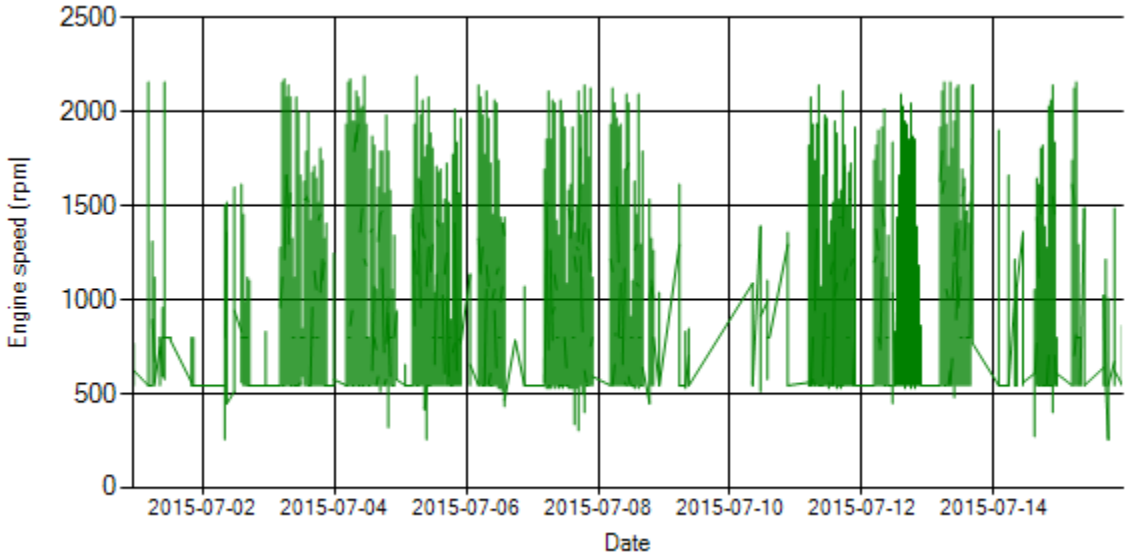


Figure 10- Engine speed distribution over the period

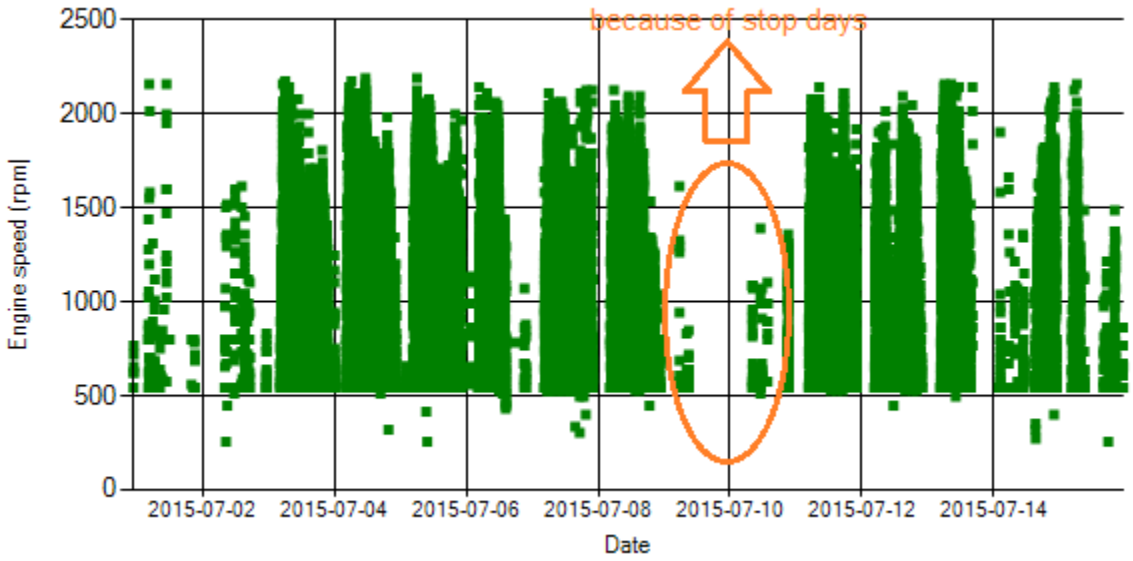


Figure 11- Engine speed diagram for calculating CPK's working days

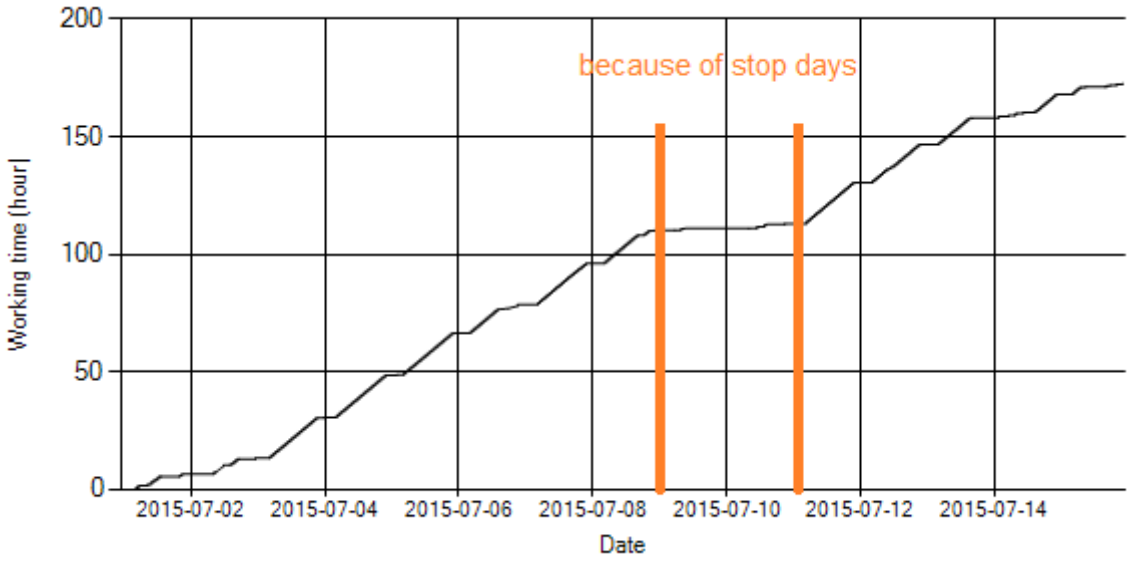


Figure 12- Time diagram for calculating CPK's working days

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, data logger didn't sample on Jul 9th and 10th because of stop days.

Pressure-Engine Speed diagrams

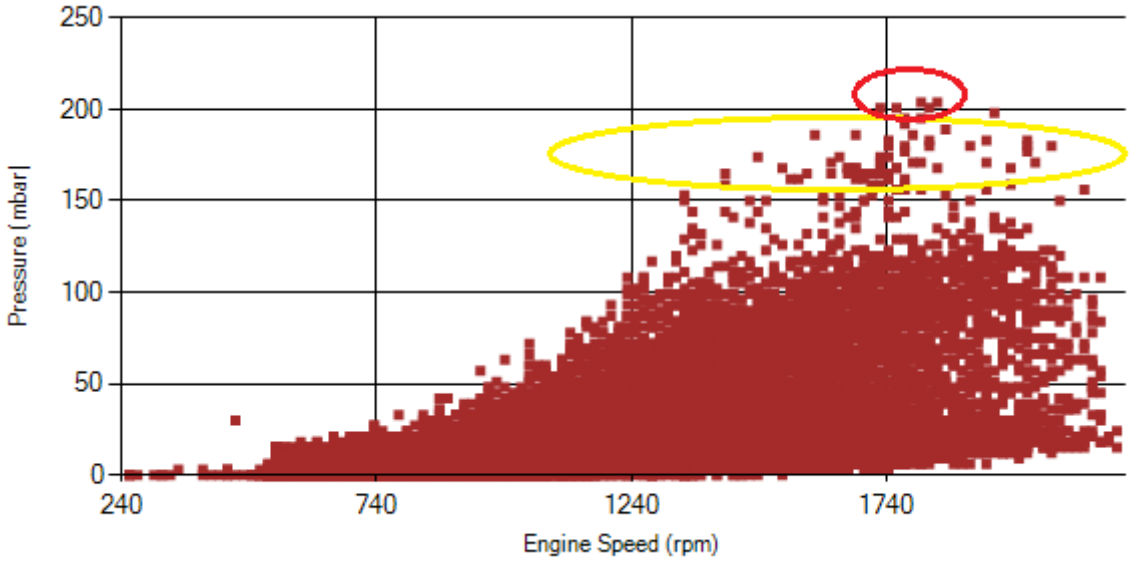


Figure 13- Pressure against engine speed

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

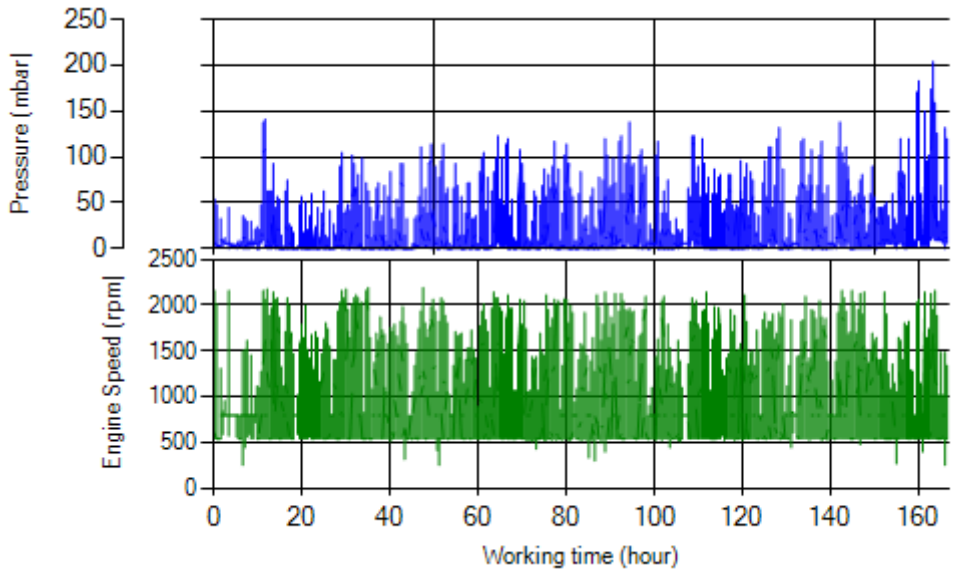


Figure 14- P,N distribution vs. working hours

Temperature-Engine Speed diagrams

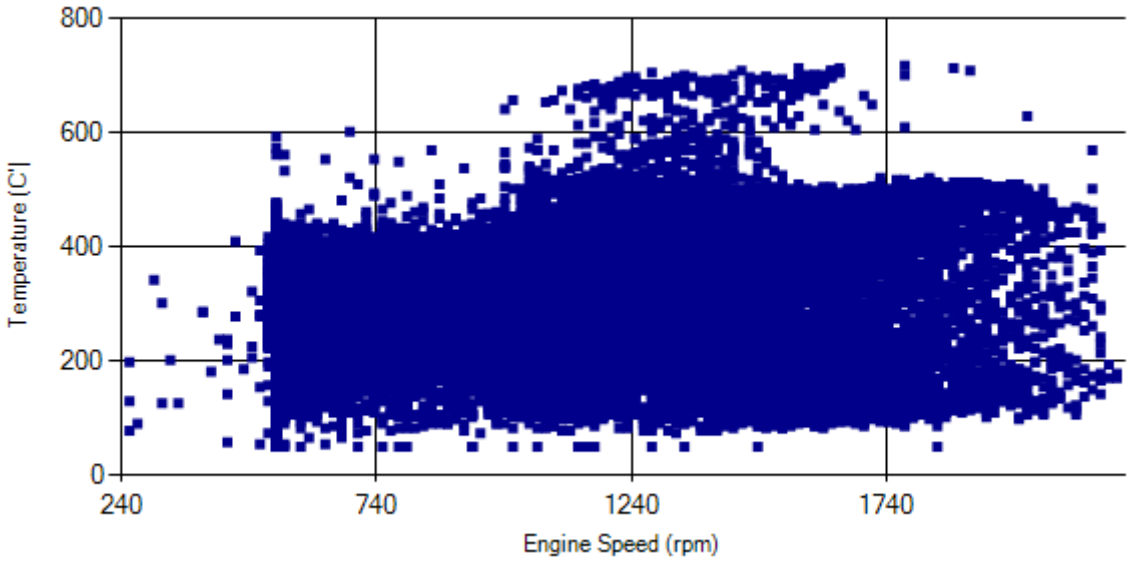


Figure 15- Temperature against engine speed

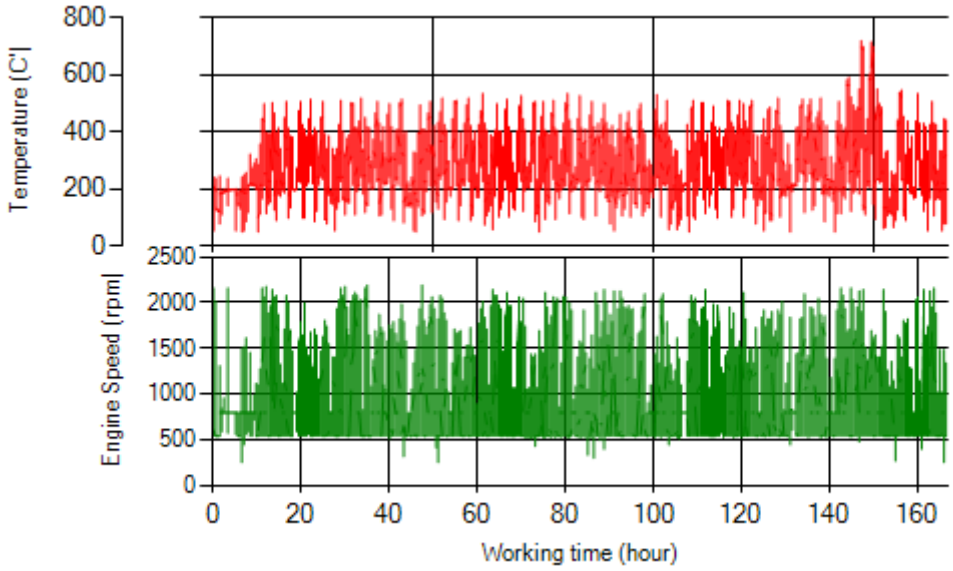


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.01% of total working time pressure is above 200 mbar and 0.16% 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 21% 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☐

AZMOON SANAT ARVIN	Document Number: DPF2015072/1 Date: 15/Aug/2015

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/Jul/2015 – 31/Jul/2015 (sixteen days)
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.04 [1/m]

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)	46244 km
Bus mileage over the period	2053 km
Working days over the period	14 days
Stop days	2 days
Data logger working days	14 days
Working hours over the period	202 hours 24 minutes
Average working hours per day (including stop days)	12 hours 39 minutes
Bus average speed	10.20 km/hr
idle speed time to all working time ration	49 %*
Total Bus fuel consumption over the period	1335 lit
Fuel consumption per hour	6.61 lit/hr
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	571 lit
Average additive consumption	278 cc/km
Additive consumption to fuel ration	428 cc per 1000 lit (batch dosing with tank level)

*Notice: Engine rotational speed for this vehicle when air conditioning system is on, is approximately 800 rpm and without use of cooling system is about 544 rpm.

Temperature, Pressure and Engine Speed Overview

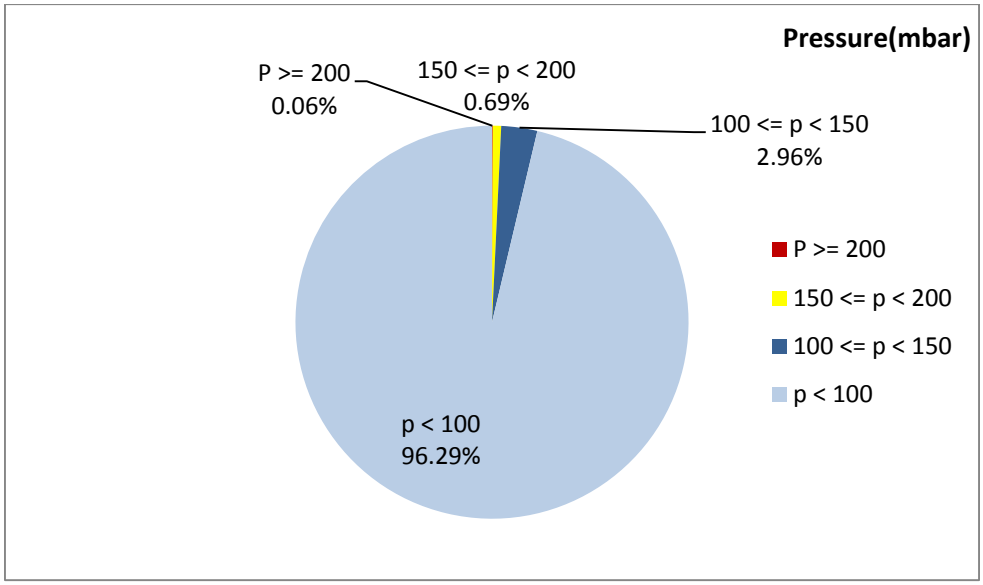


Figure 1- Pressure distribution over the working hours

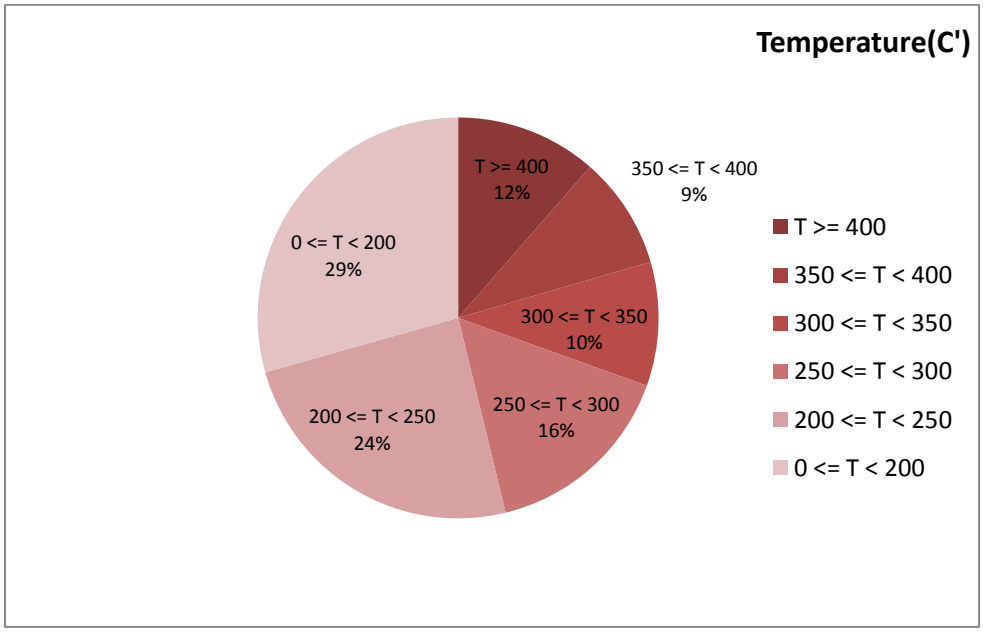


Figure 2-Temperature distribution over the working hours

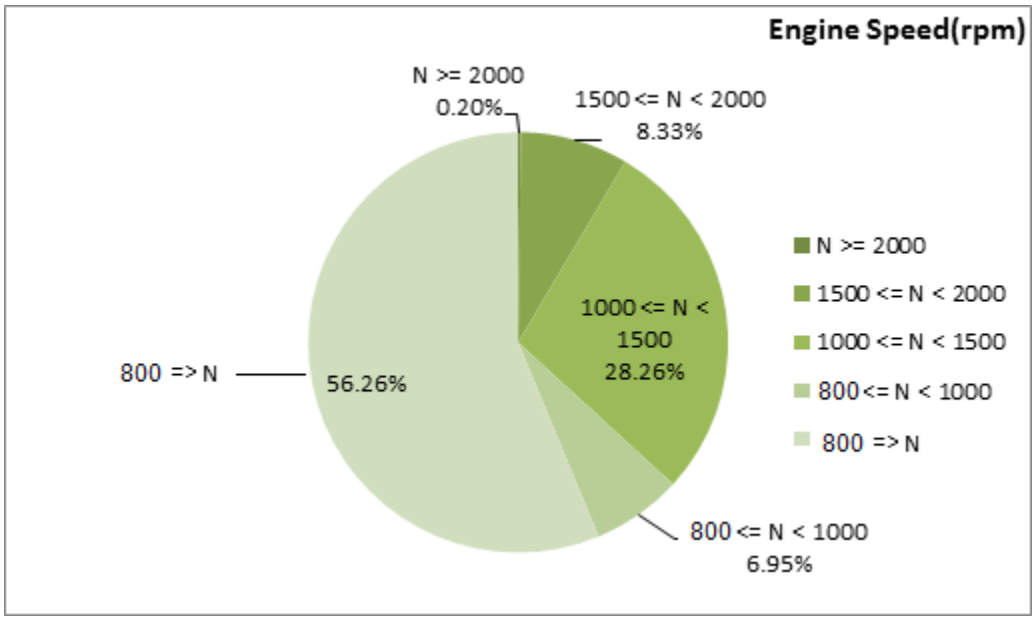


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
259.67	23.14	905

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
302.38	37.09	1138

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
546-50	231-0	2144-256

Detailed Pressure Analysis

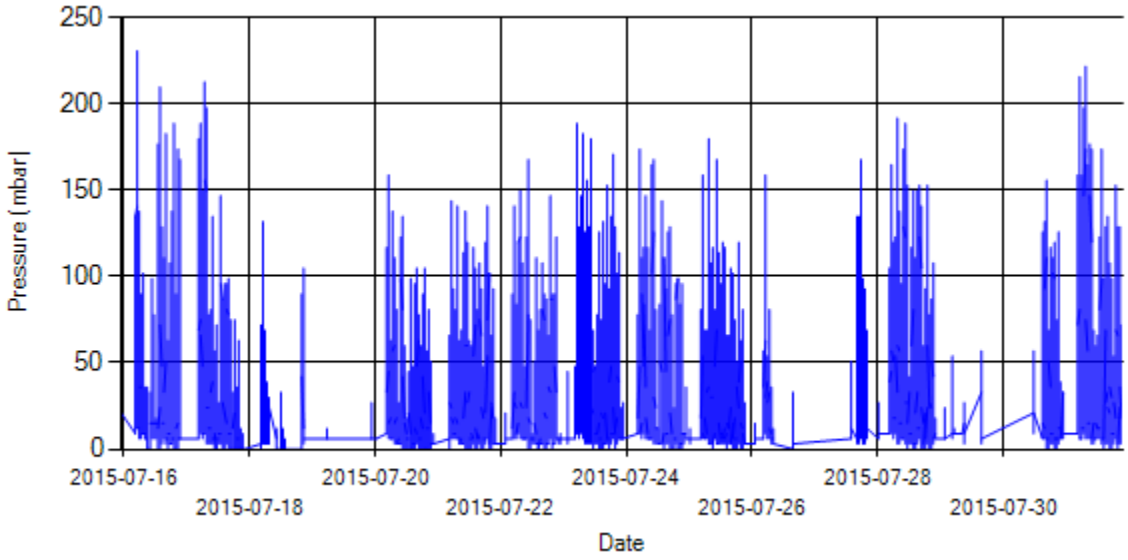


Figure 4- Pressure distribution over the period

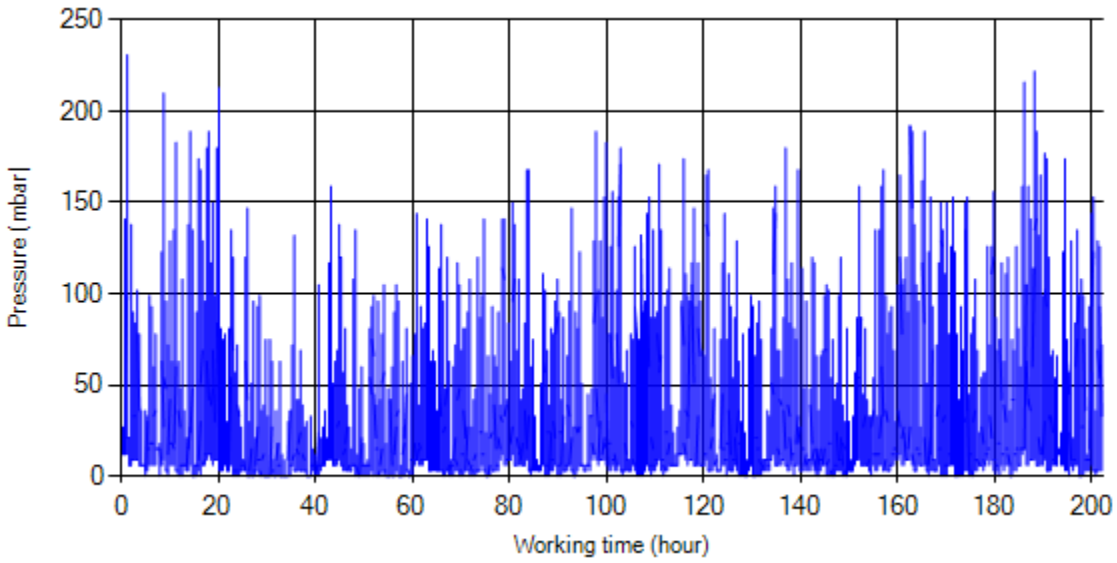


Figure 5- Pressure vs. working hours

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

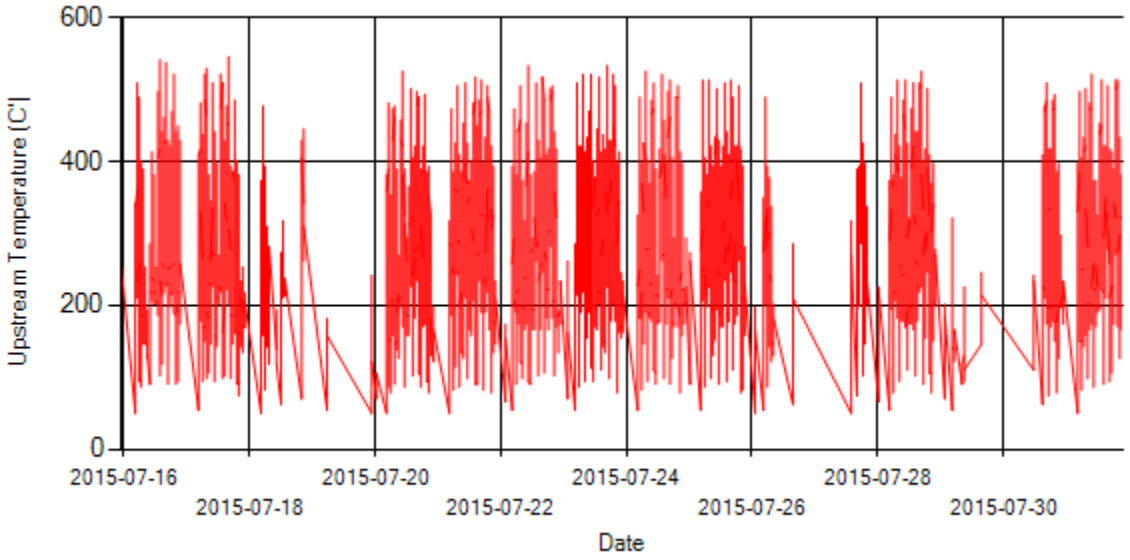


Figure 6- Temperature distribution over the period

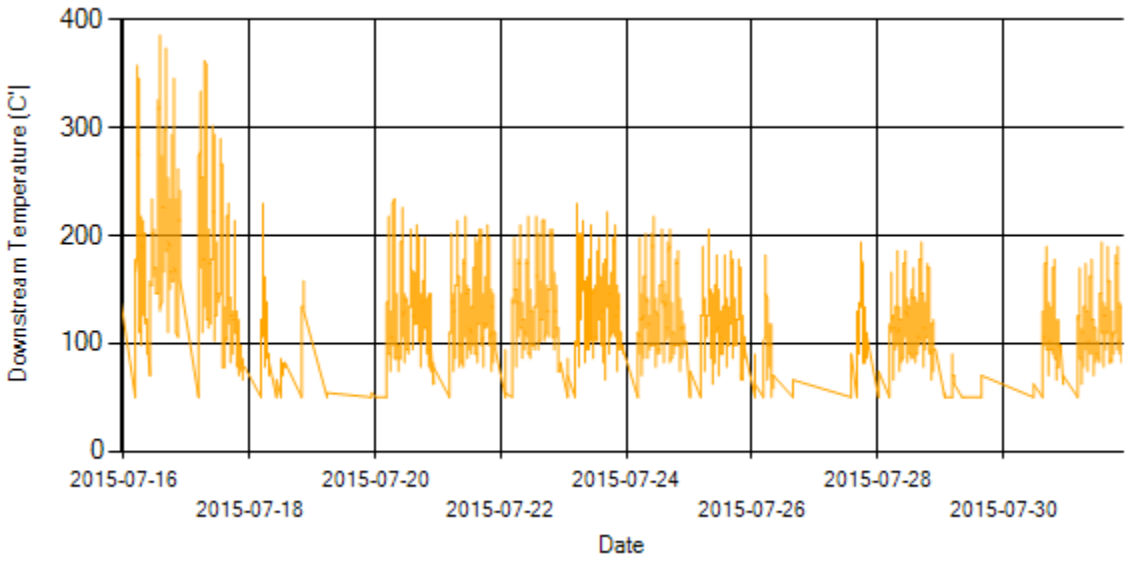


Figure 7- Temperature distribution over the period

Notice: DPF downstream temperature sensor got problem during this period and was showing low and unreasonable values.

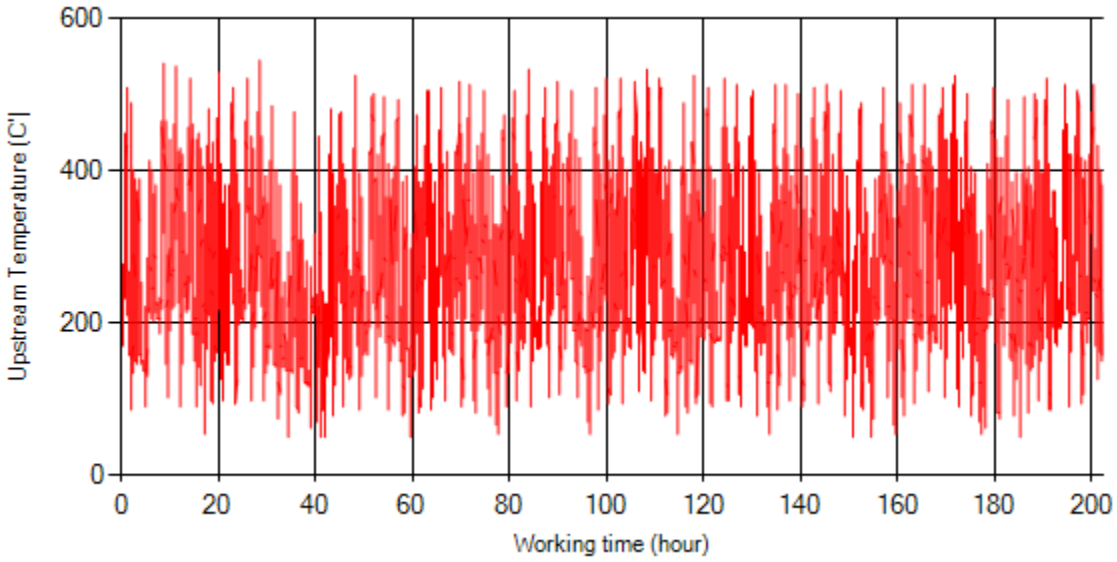


Figure 8- Temperature vs. working hours

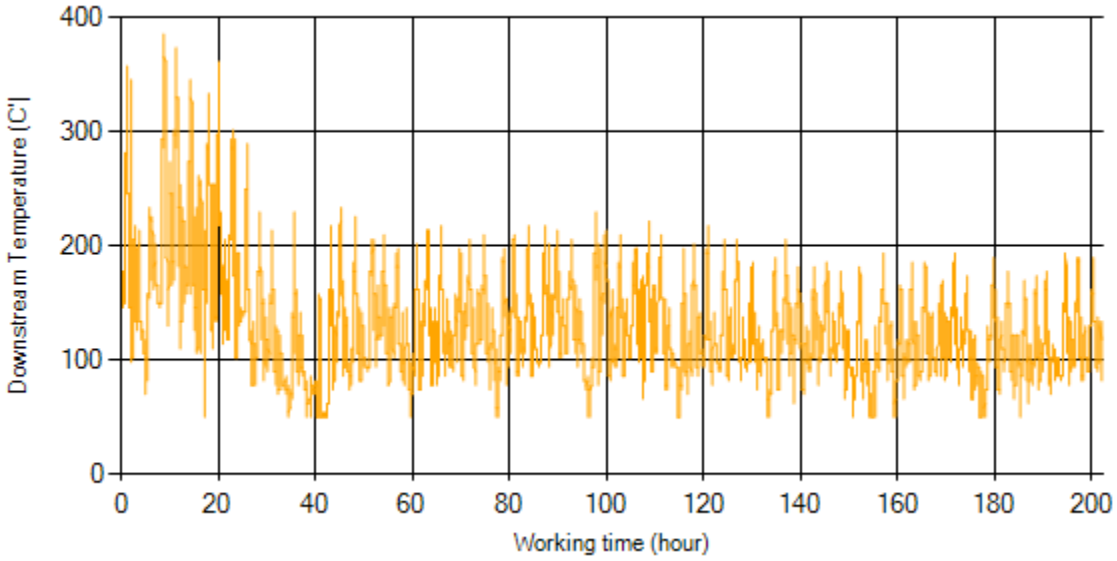


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

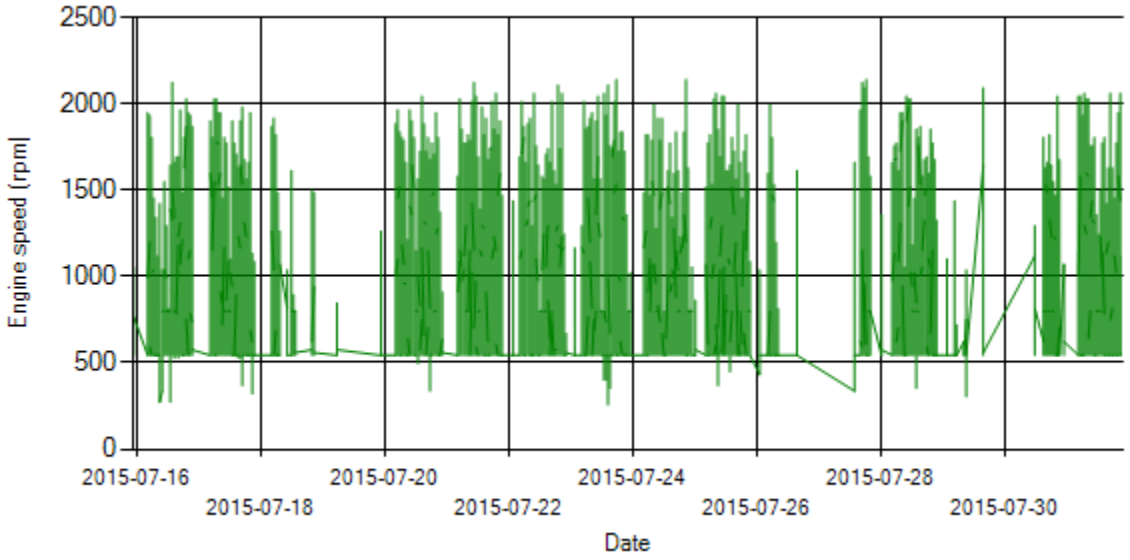


Figure 10- Engine speed distribution over the period

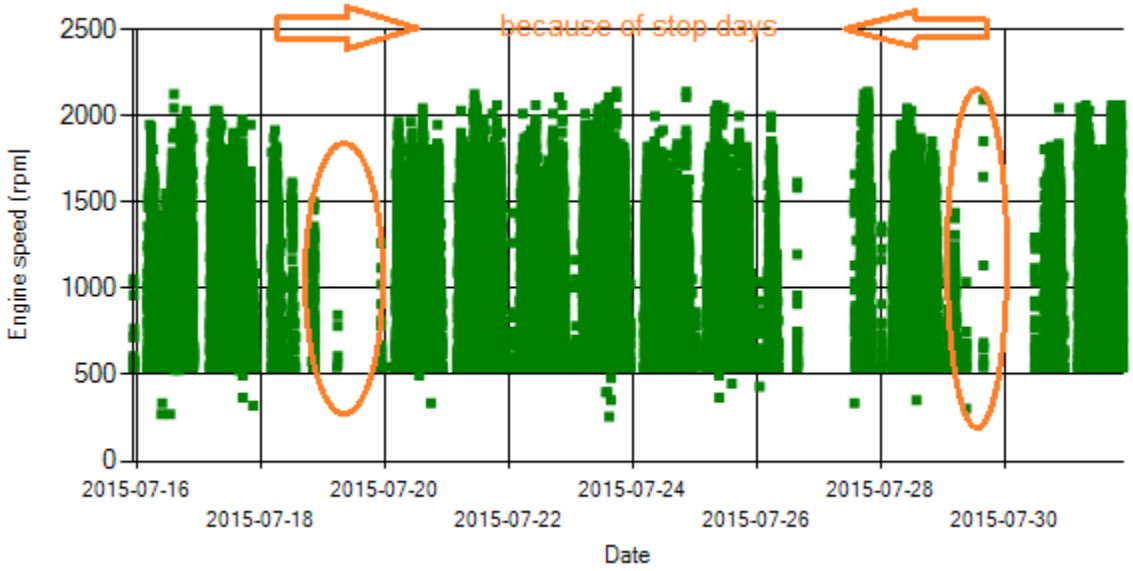


Figure 11- Engine speed diagram for calculating CPK's working days

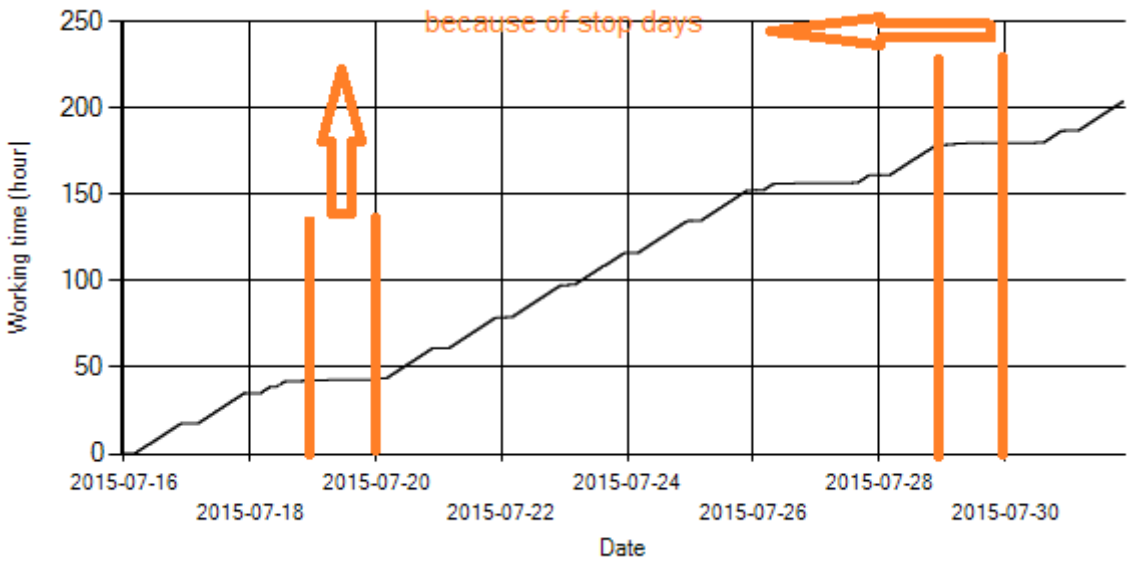


Figure 12- Time diagram for calculating CPK's working days

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, data logger didn't sample on Jul 19th and 27th.

Pressure-Engine Speed diagrams

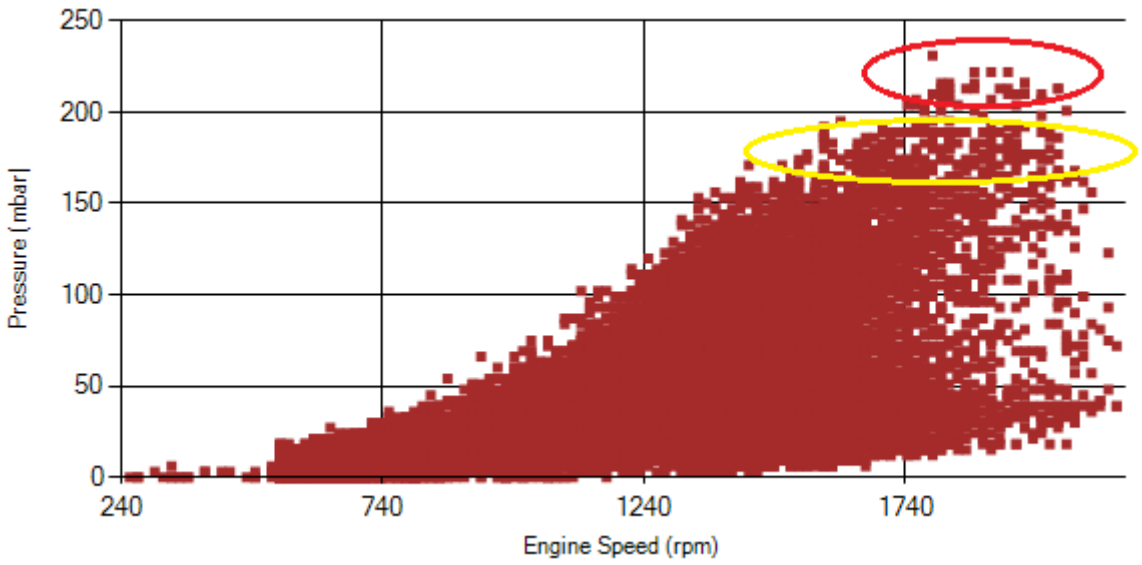


Figure 13- Pressure against engine speed

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

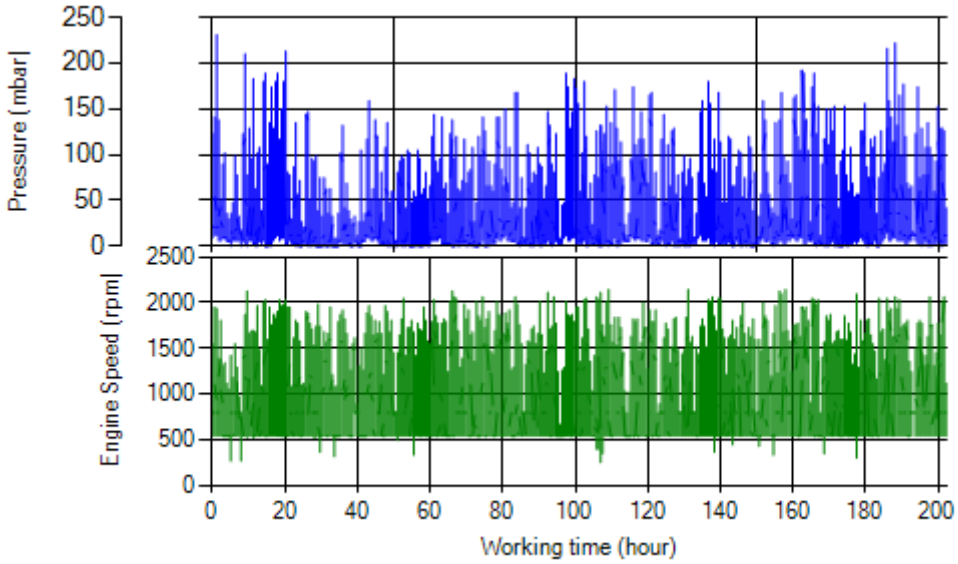


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

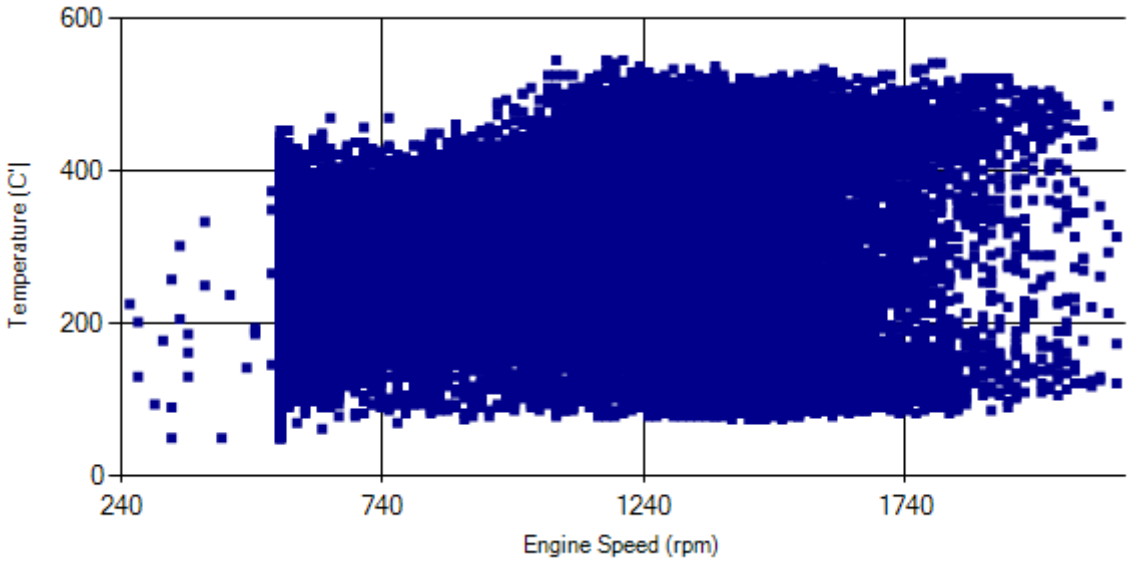


Figure 13- Temperature against engine speed

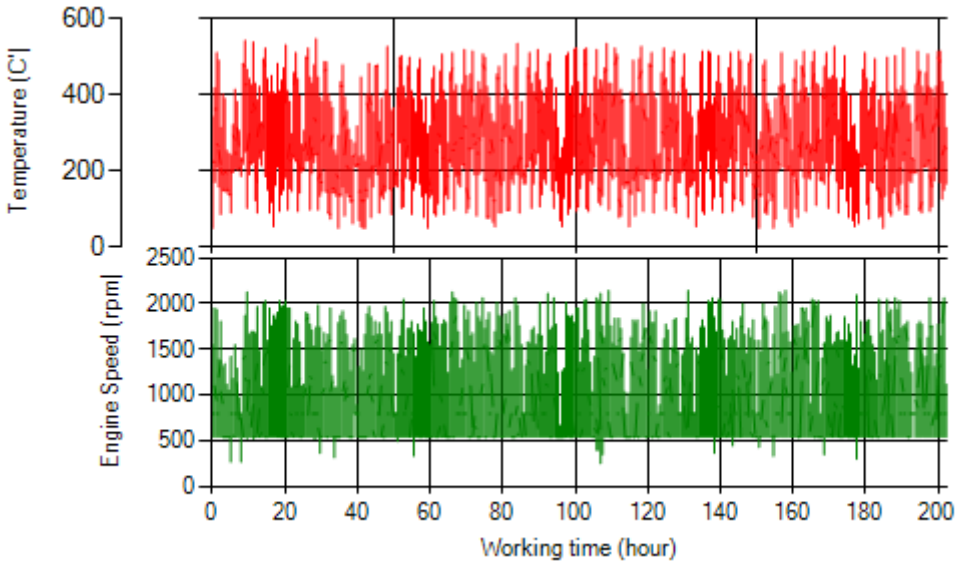


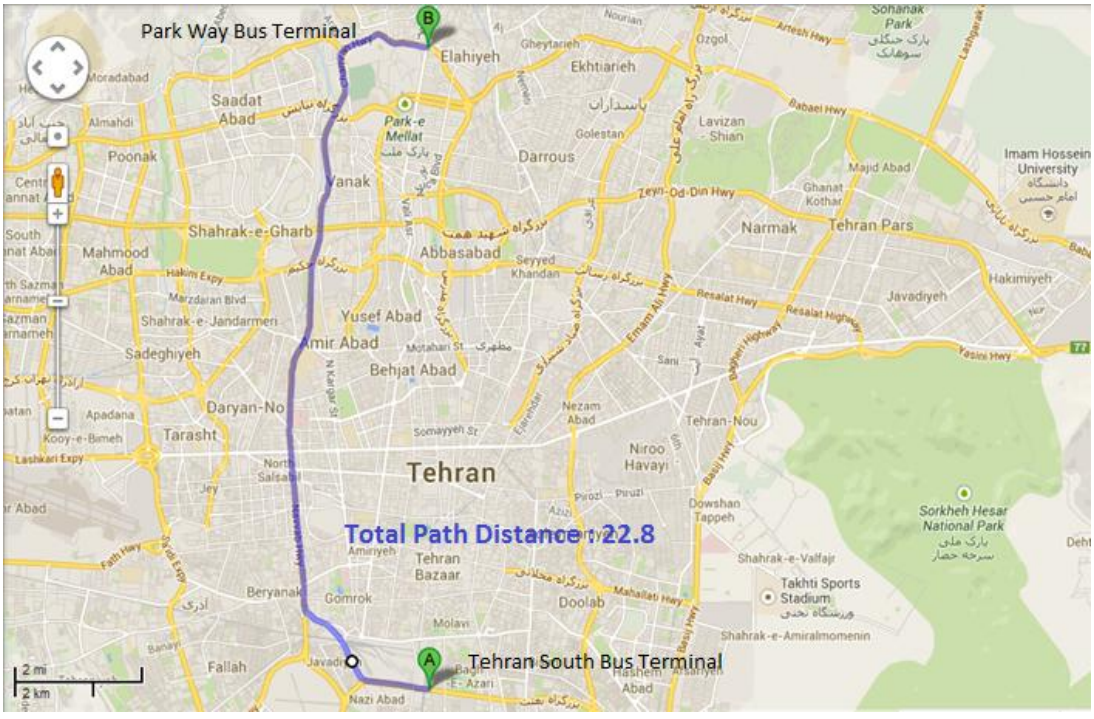
Figure 14- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.06% of total working time pressure is above 200 mbar and 0.75% 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 21% 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)



AZMOON SANAT ARVIN	Document Number: DPF2015071/1 Date: 08/Aug/2015

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	01/Jul/2015 – 15/Jul/2015 (fifteen days)
K value - DPF upstream	1.01 [1/m]
K value – DPF downstream	0.01 [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)	24343 km
Bus mileage over the period	2610 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	167 Hour 55 minutes
Average working hours per day (including stop days)	11 Hour 11 minutes
Bus average speed	15.53 km/hr
Idle speed time to all working time ration	53 %
Total Bus fuel consumption over the period	1540 lit
Fuel consumption per hour	9.17 lit/hr
Average fuel consumption	0.59 lit/km
Total Bus additive consumption over the period	0.740 lit
Average additive consumption	283 cc/km
Additive consumption to fuel ration	480 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

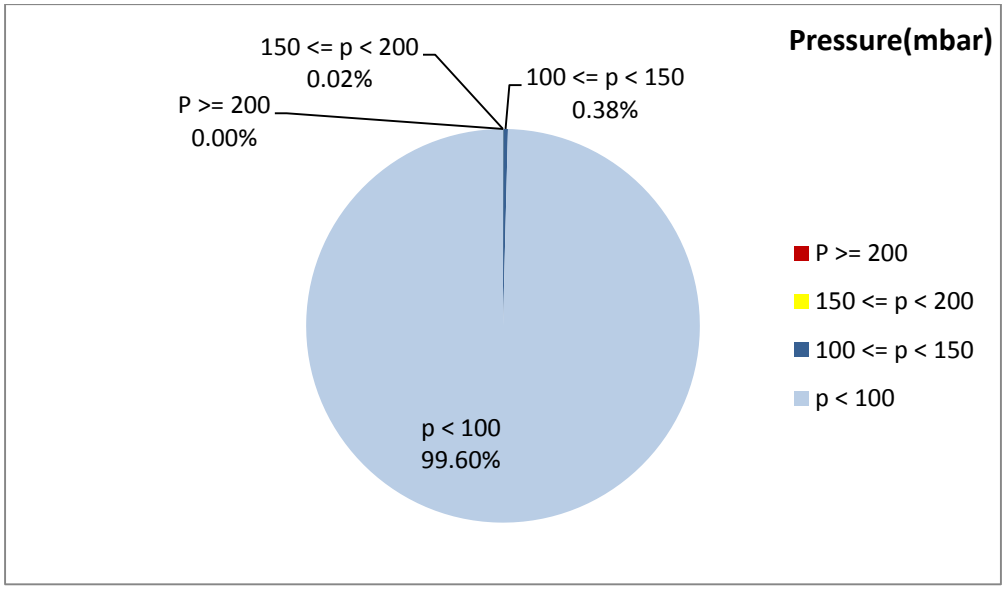


Figure 1- Pressure distribution over the working hours

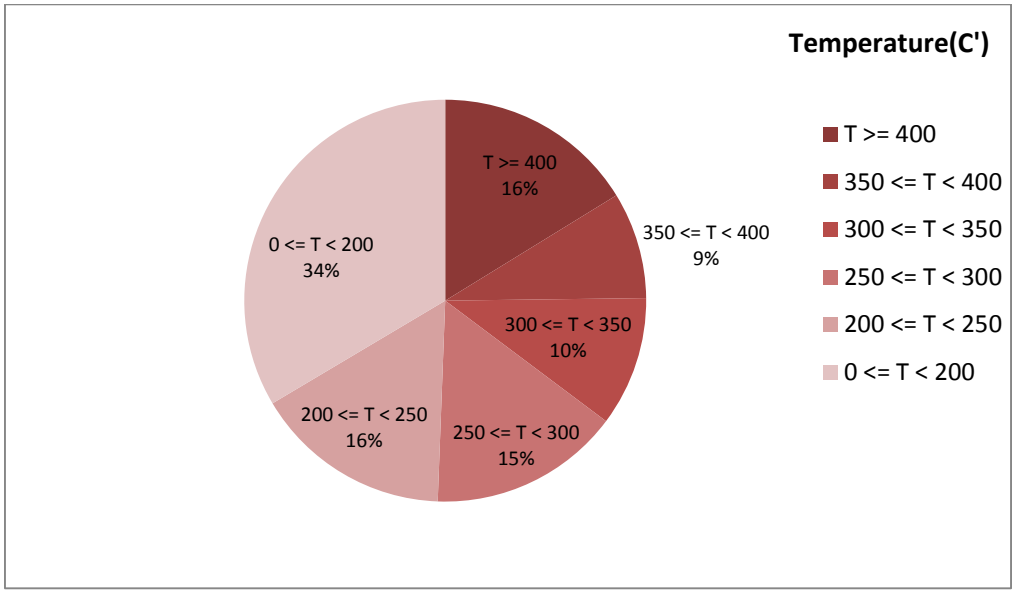


Figure 2-Temperature distribution over the working hours

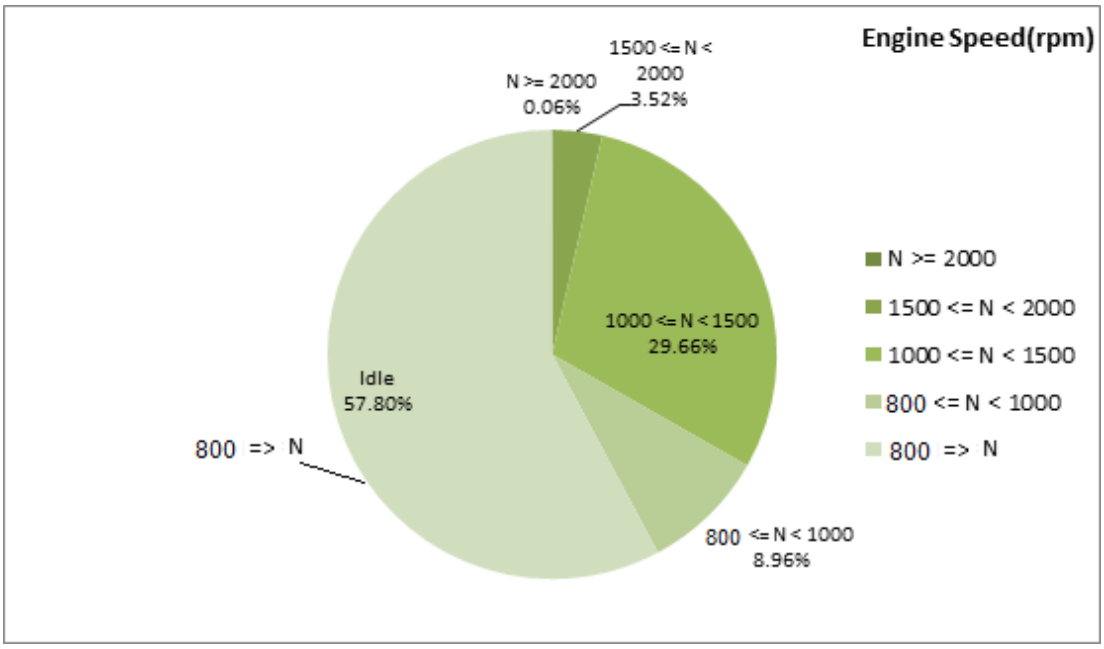


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
272.15	12.26	823

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
331.47	21.88	1067

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
674-50	189-0	2224-256

Detailed Pressure Analysis

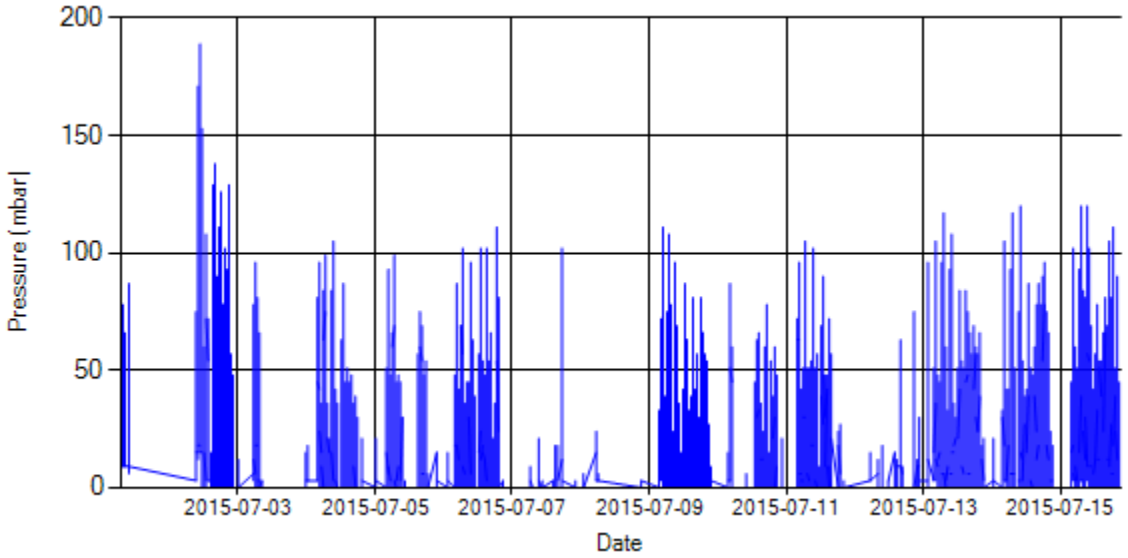


Figure 4- Pressure distribution over the period

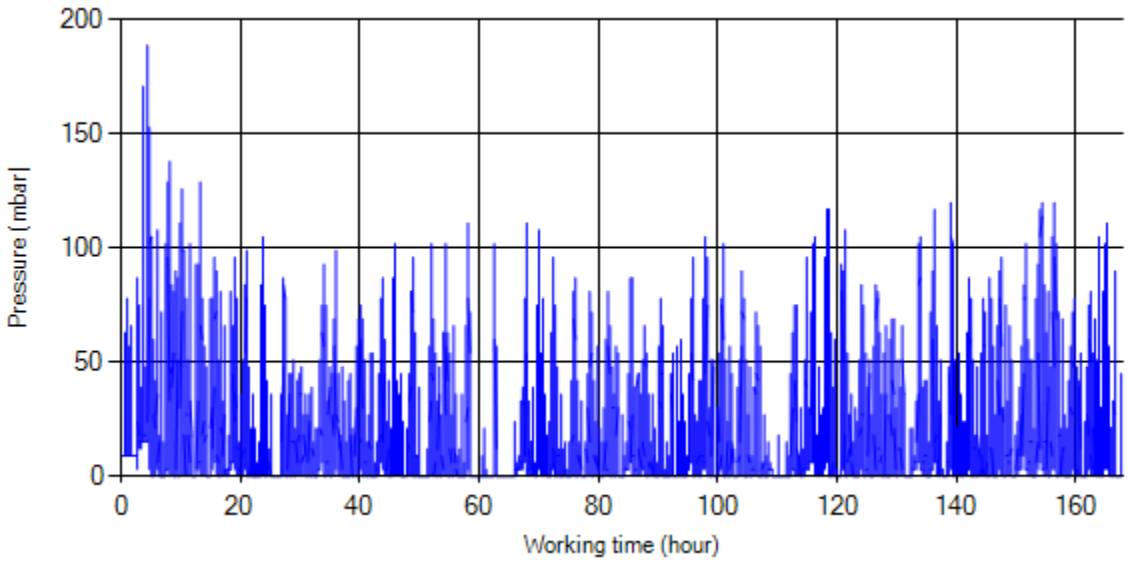


Figure 5- Pressure vs. working hours

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

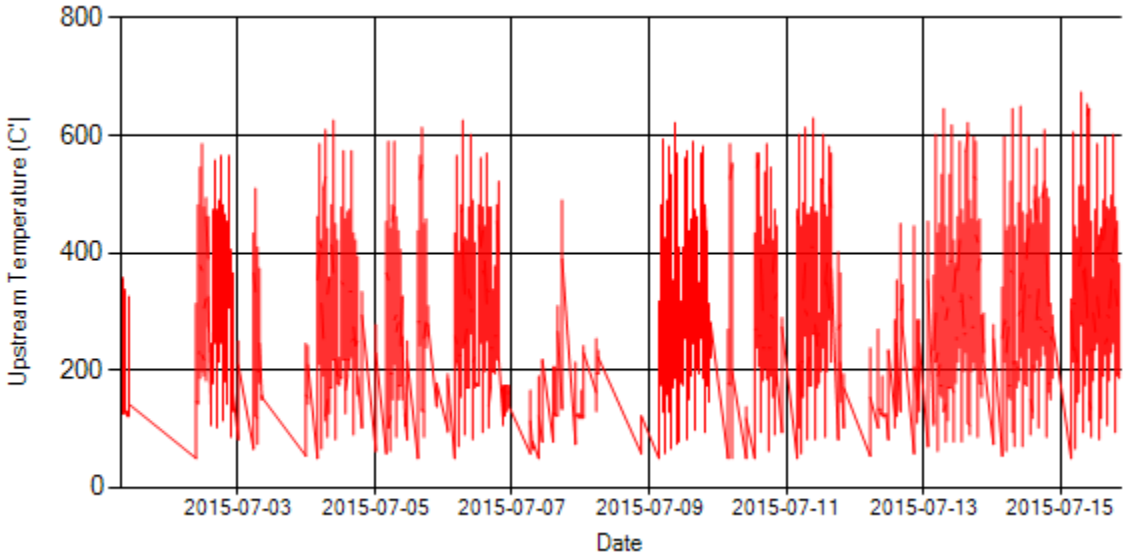


Figure 6- Temperature distribution over the period

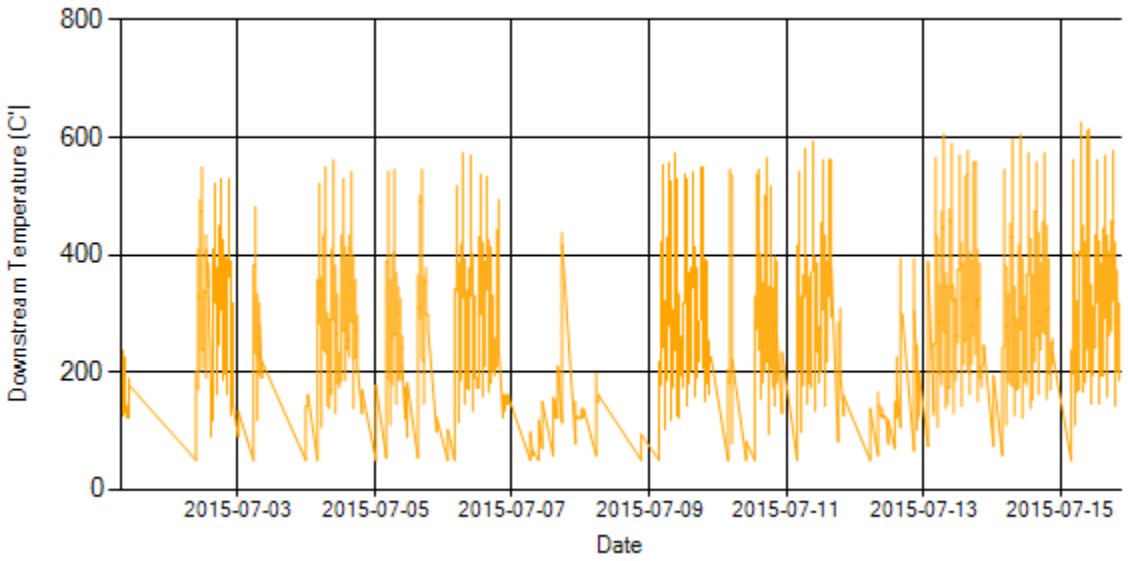


Figure 7- Temperature distribution over the period

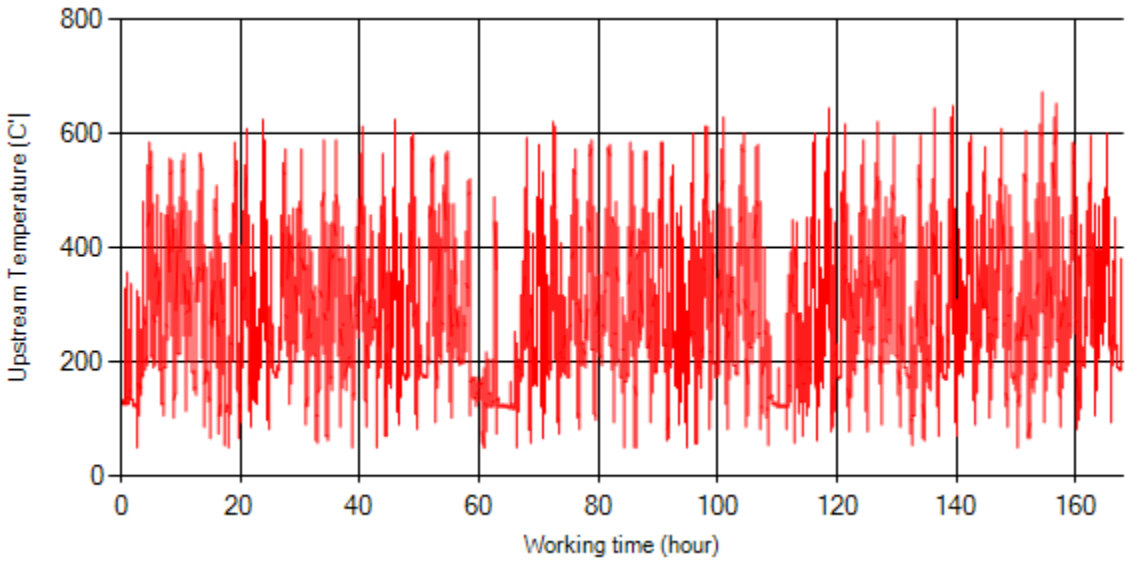


Figure 8- Temperature vs. working hours

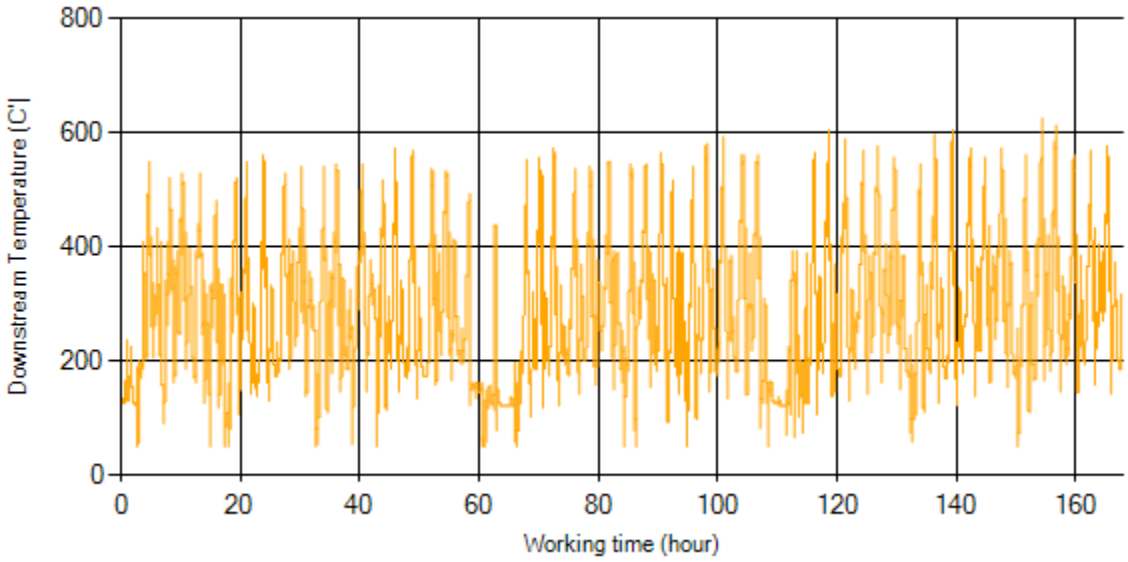


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

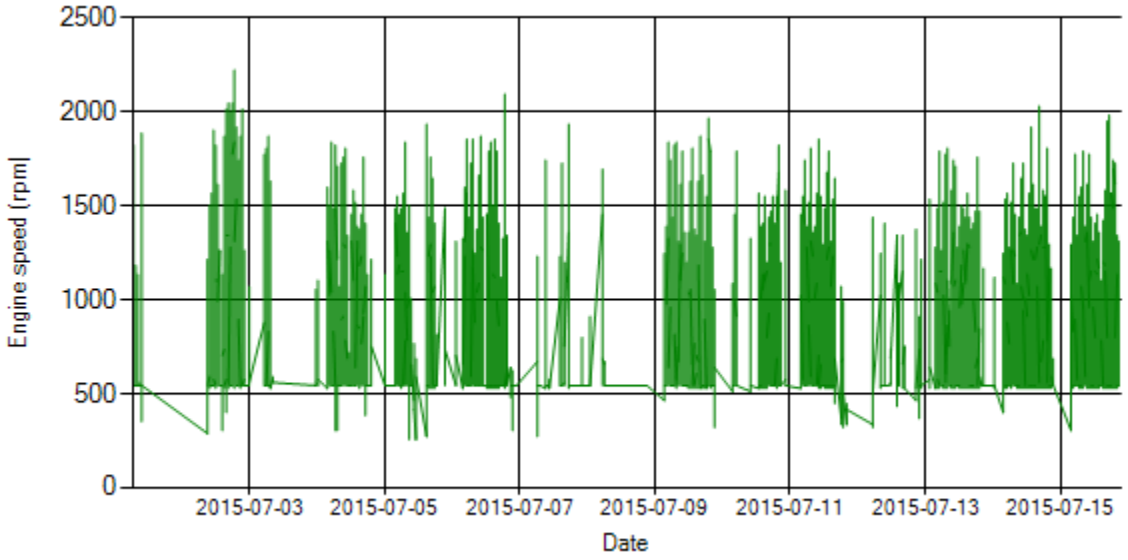


Figure 10- Engine speed distribution over the period

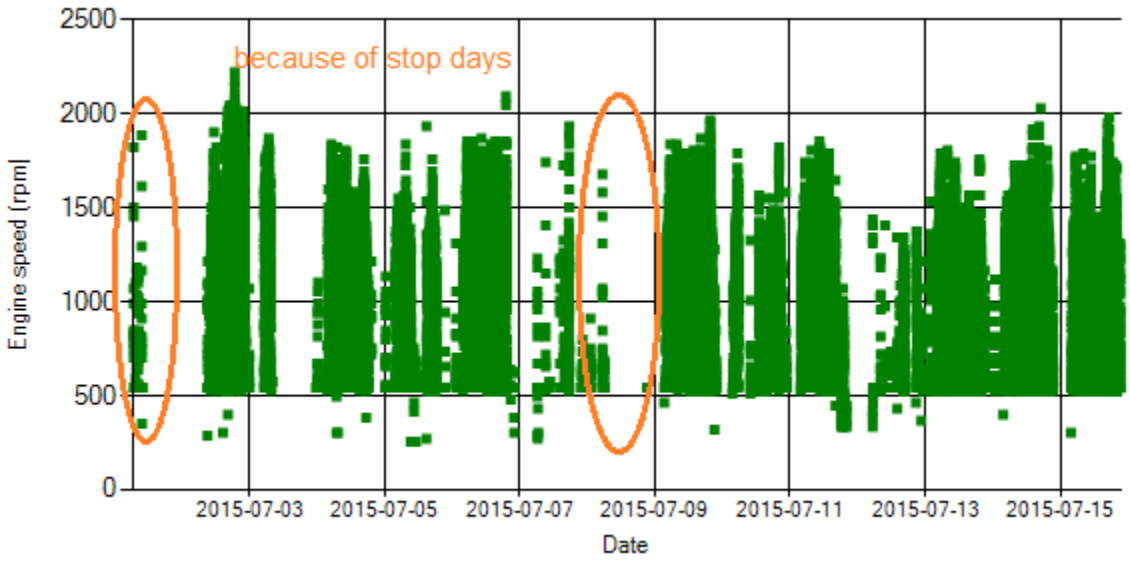


Figure 11- Engine speed diagram for calculating CPK's working days

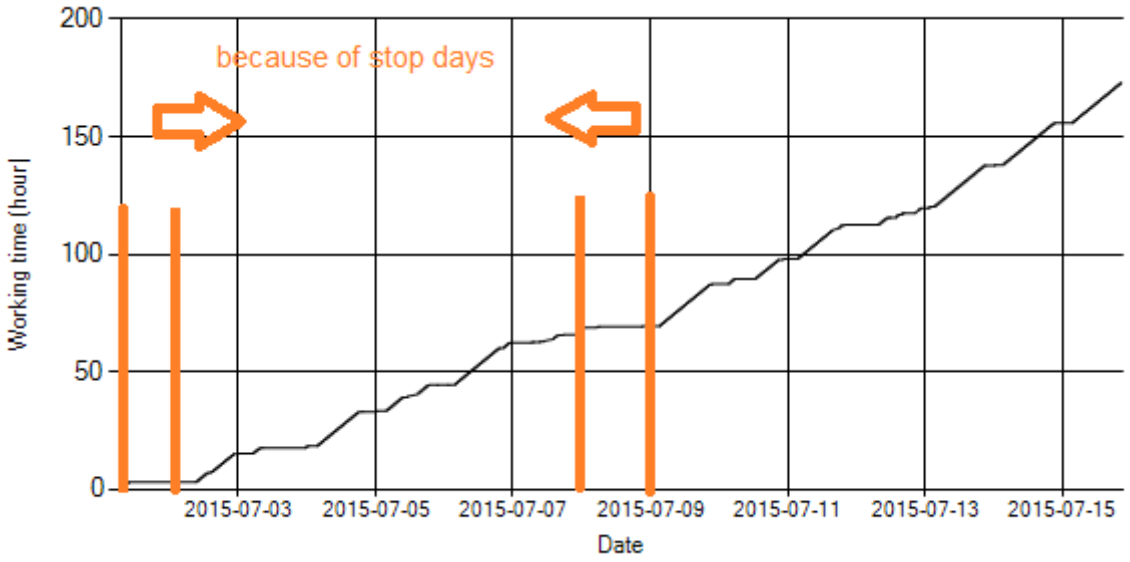


Figure 12- Time diagram for calculating CPK's working days

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 didn't sample on Jul 1st and 8th.

Pressure-Engine Speed diagrams

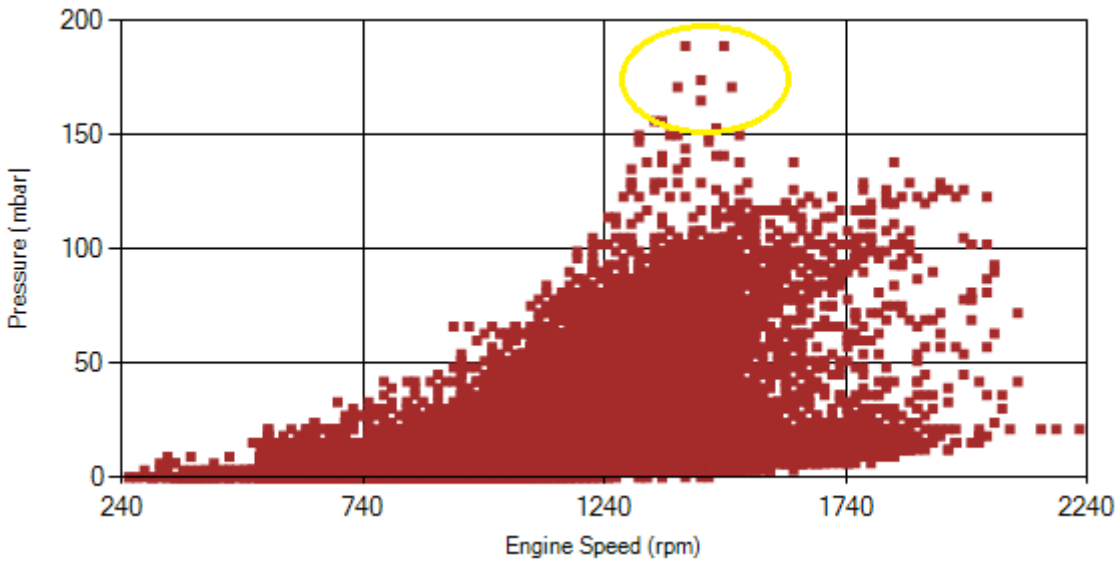


Figure 13- Pressure against engine speed

Notice: Yellow alarm (200>pressure>150) region was indicated in figure 13.

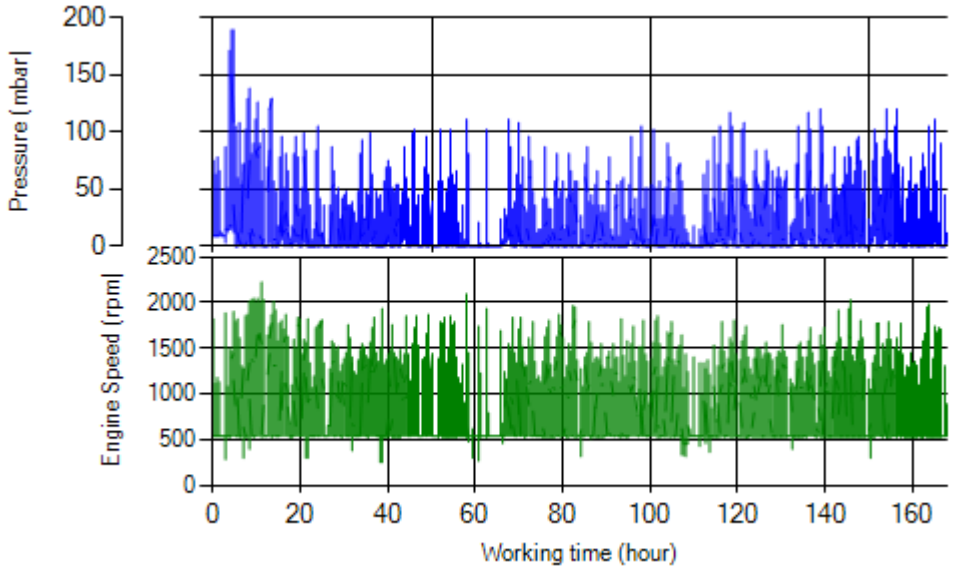


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

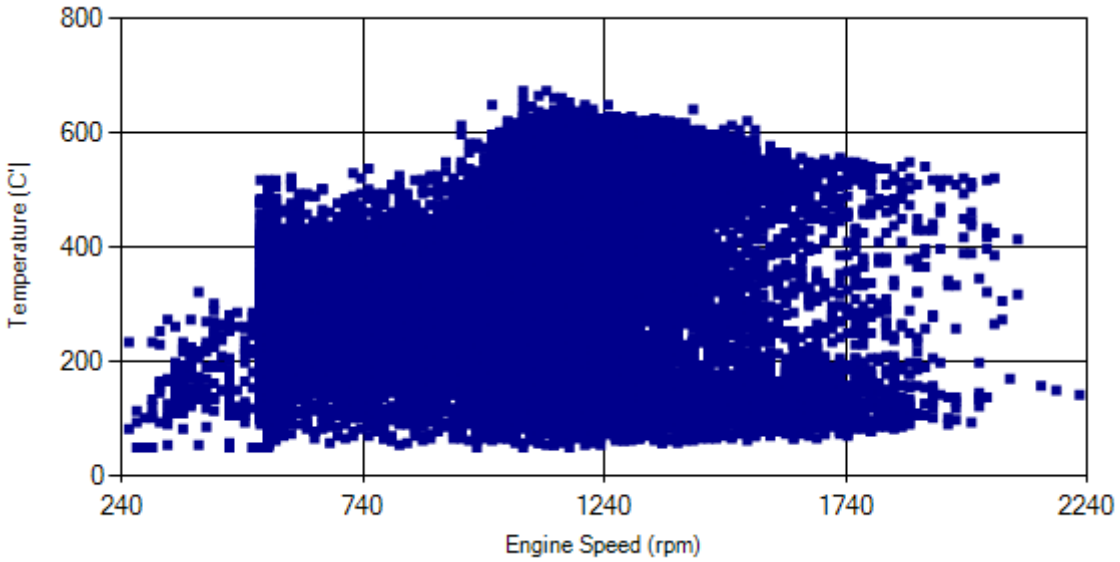


Figure 13- Temperature against engine speed

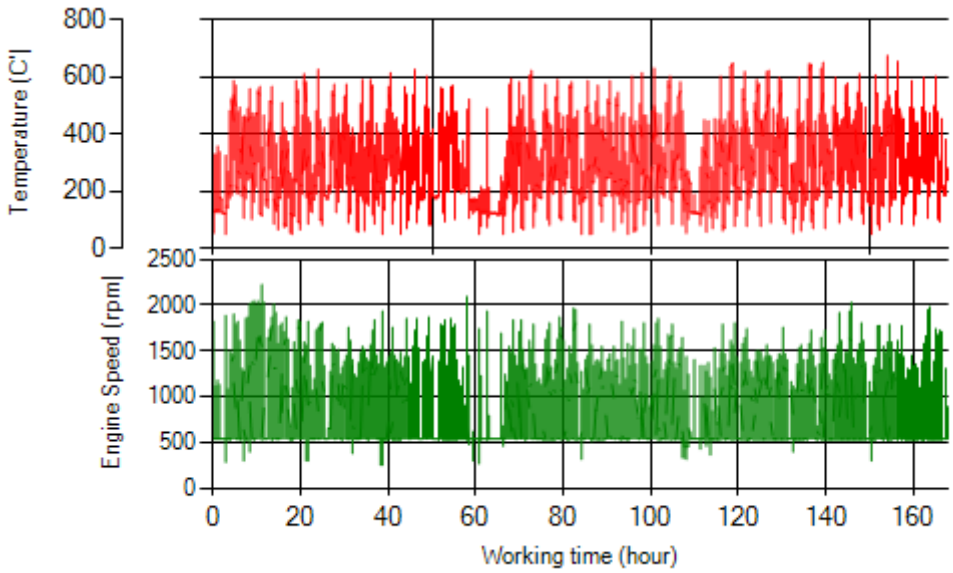


Figure 14- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.02% of total working time pressure is above 150 mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 16% of total working-time temperature is above 400 ℃ and 25% 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☐

ASA Azmoon Sanat Arvin	Document Number: DPF2015072/1 Date: 15/Aug/2015

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	016/Jul/2015 – 31/Jul/2015 (sixteen days)
K value - DPF upstream	1.01 [1/m]
K value – DPF downstream	0.01 [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)	27398 km
Bus mileage over the period	3055 km
Working days over the period	15 days
Stop days	1 day
Data logger working days	13 days
Working hours over the period	176 Hour 29 Min (203 hours 38 minutes)
Average working hours per day (including stop days)	13 Hour 35 Min
Bus average speed	15.01 km/hr
idle speed time to all working time ration	55 %
Total Bus fuel consumption over the period	1951 lit
Fuel consumption per hour	10.57 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	0.917 lit
Average additive consumption	300 cc/km
Additive consumption to fuel ration	470 cc per 1000 lit (batch dosing with tank level)

Notice: Data logger had problem on Jul 30th and 31st. Because of this problem average two work days were added to working hours from the data logger.

Temperature, Pressure and Engine Speed Overview

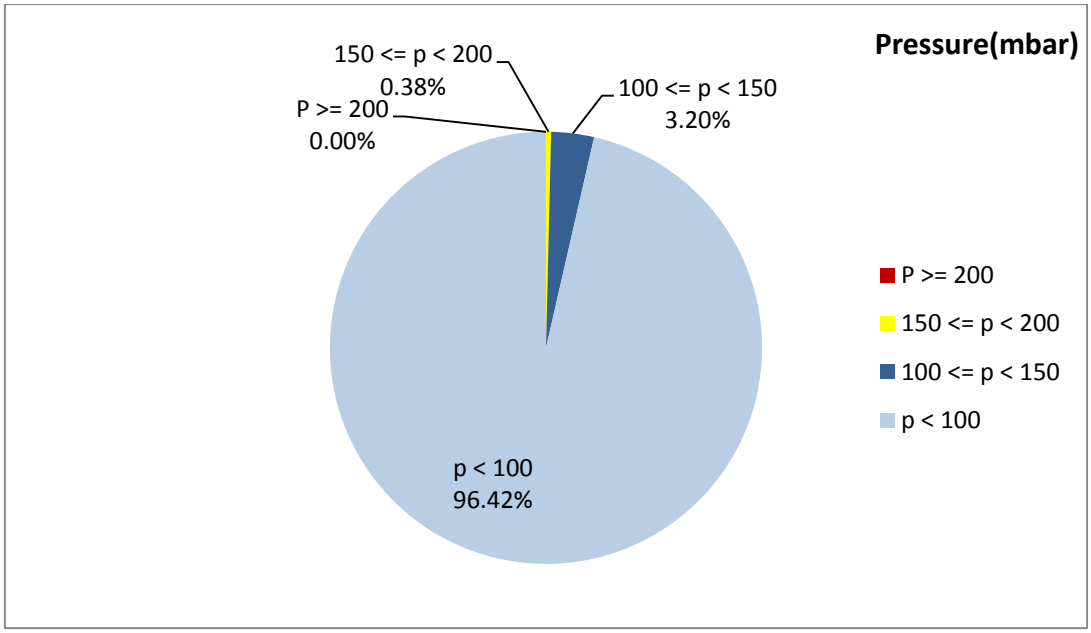


Figure 1- Pressure distribution over the working hours

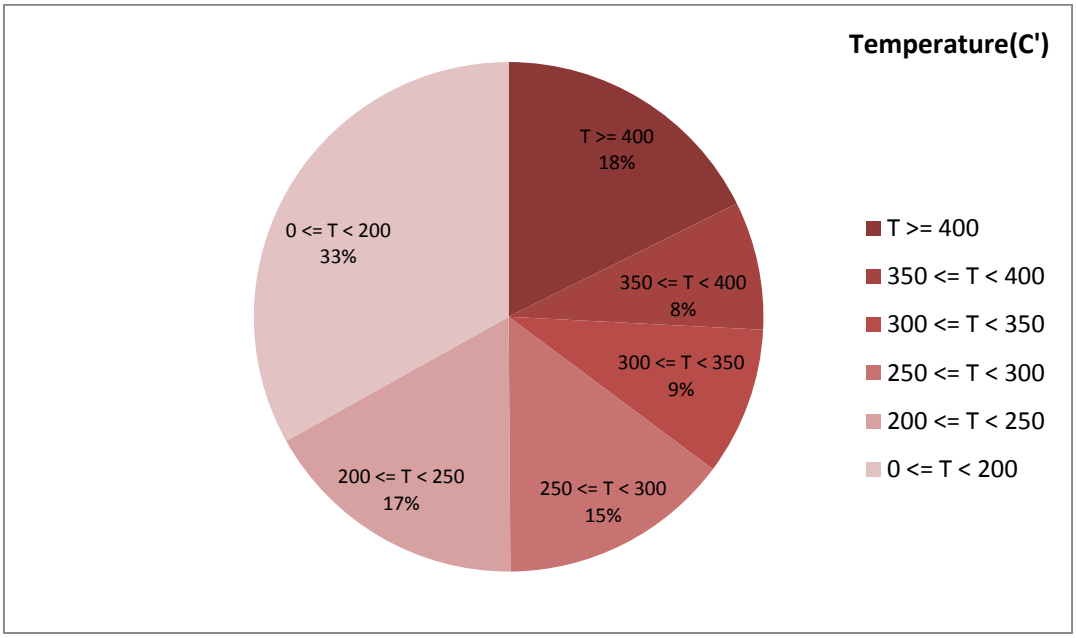


Figure 2-Temperature distribution over the working hours

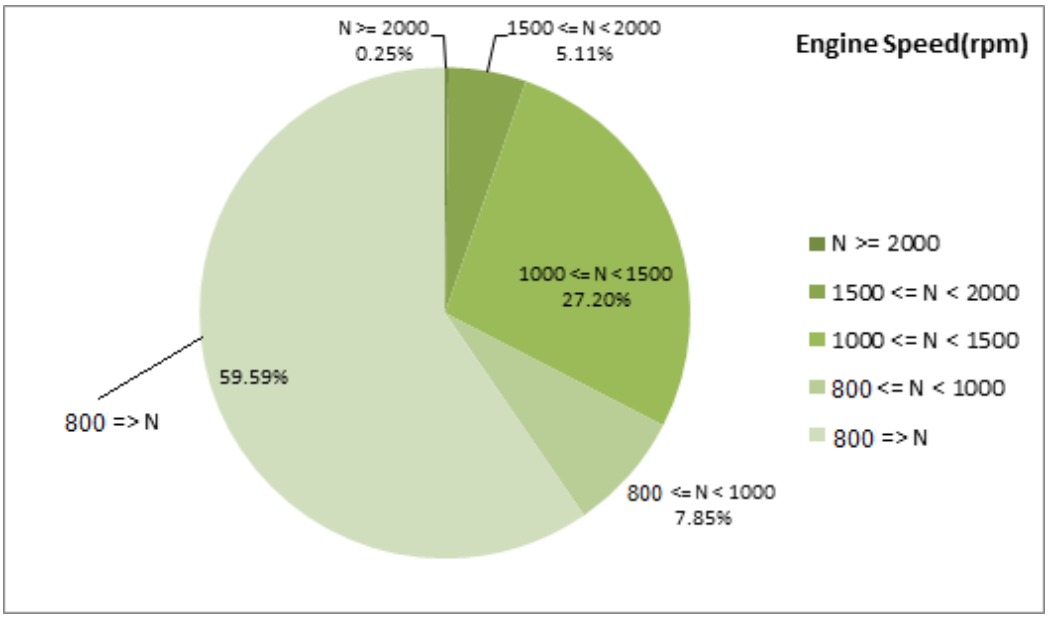


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
277.39	20.89	829

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
343.32	37.19	1100

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
694-50	180-0	2176-256

Detailed Pressure Analysis

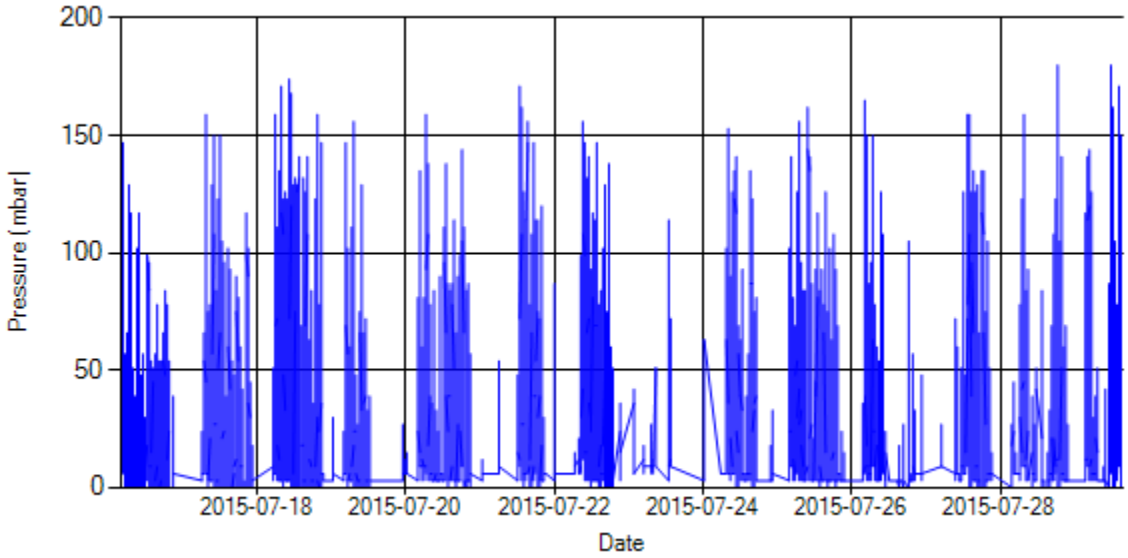


Figure 4- Pressure distribution over the period

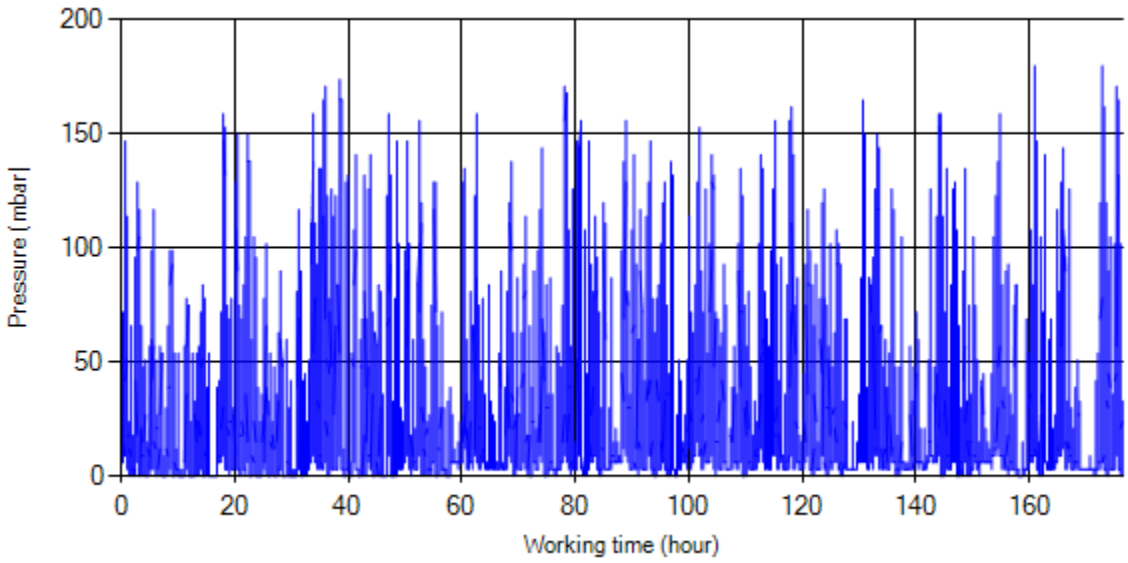


Figure 5- Pressure vs. working hours

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

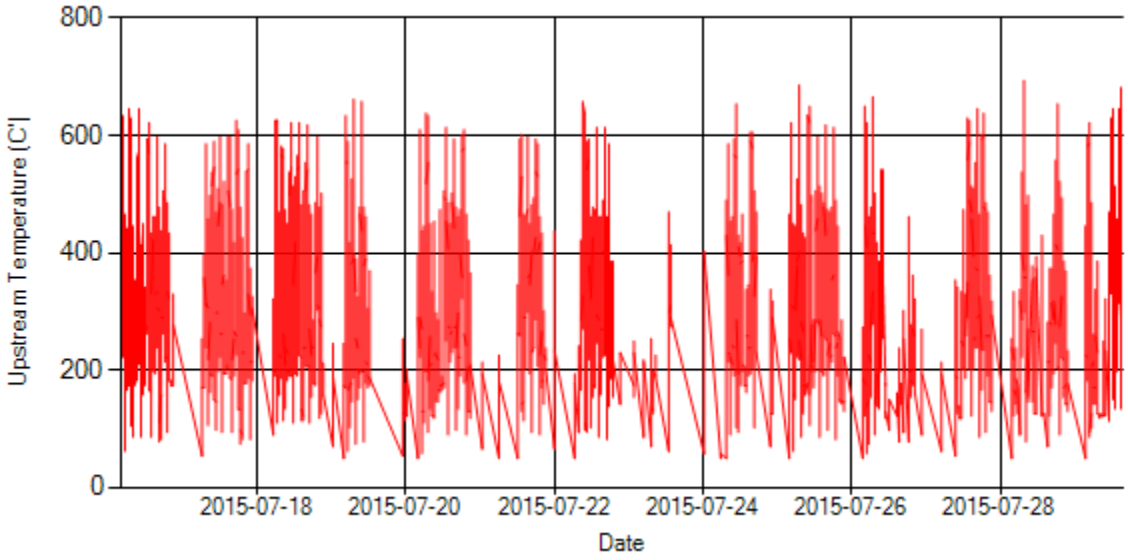


Figure 6- Temperature distribution over the period

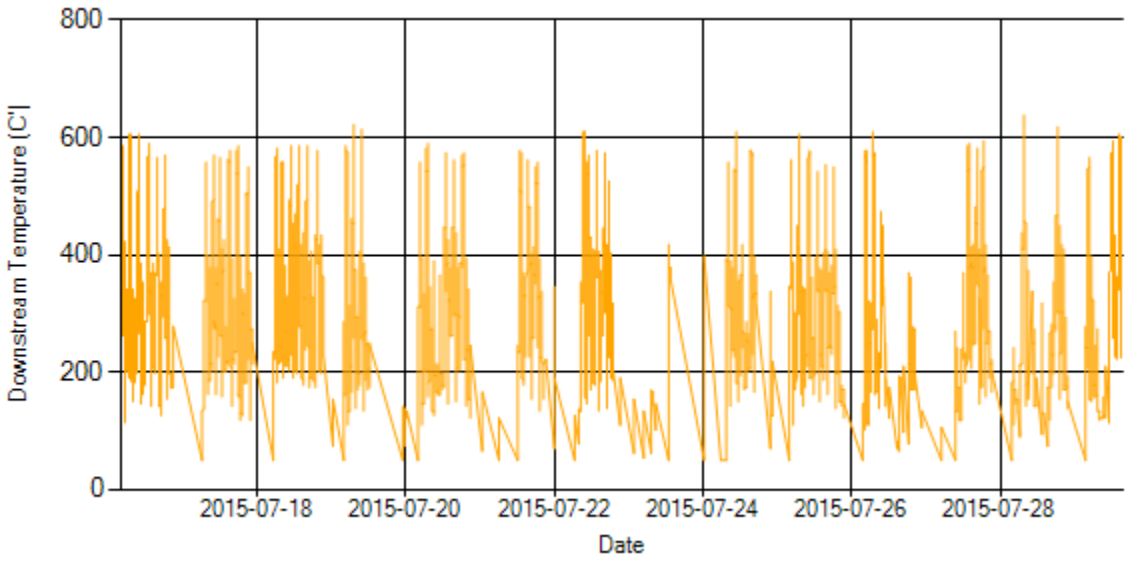


Figure 7- Temperature distribution over the period

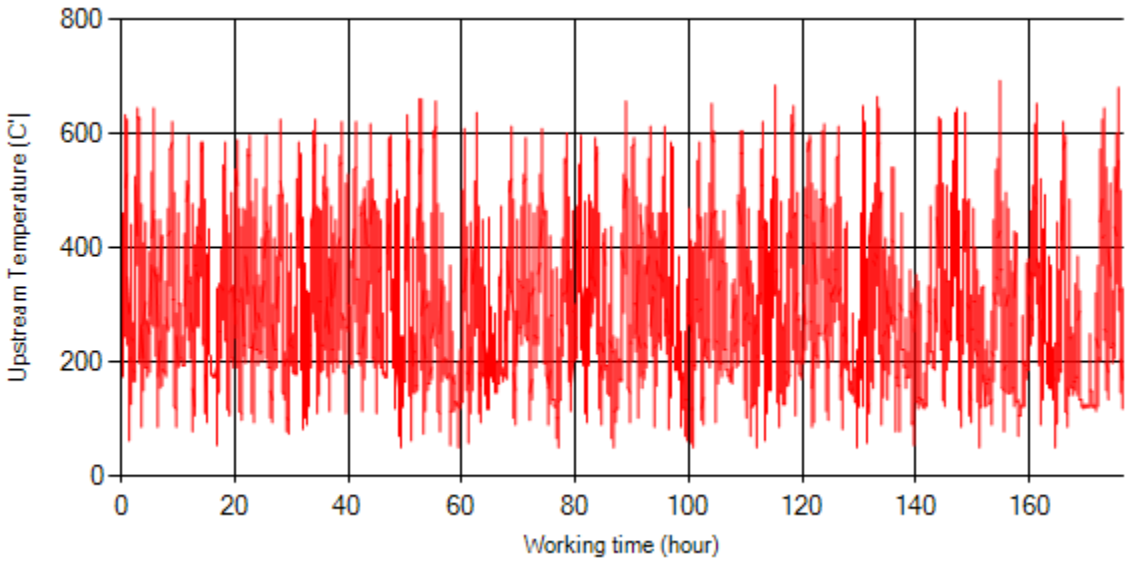


Figure 8- Temperature vs. working hours

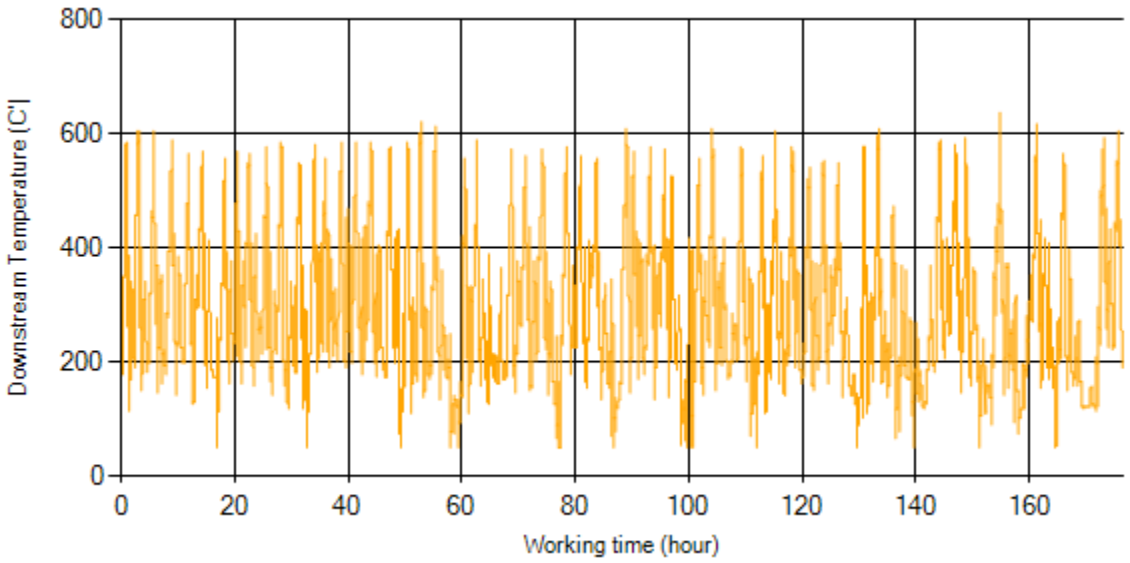


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

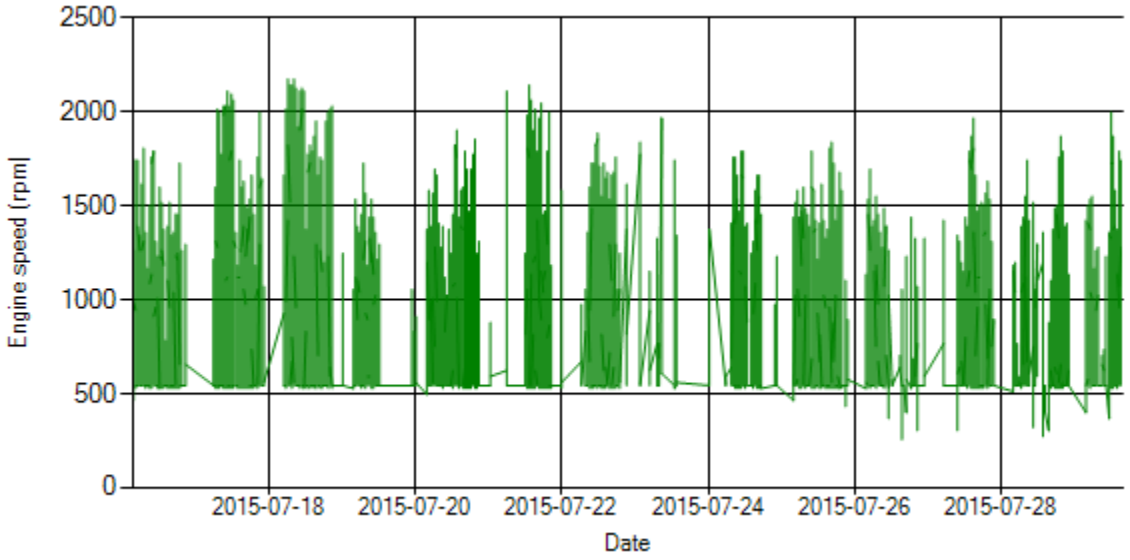


Figure 10- Engine speed distribution over the period

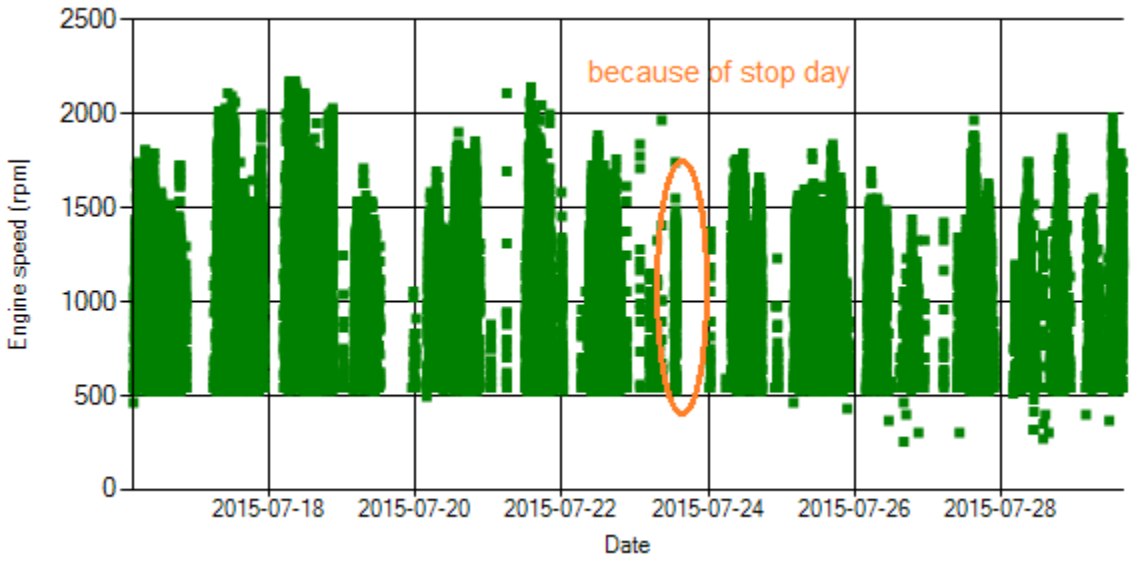


Figure 11- Engine speed diagram for calculating CPK's working days

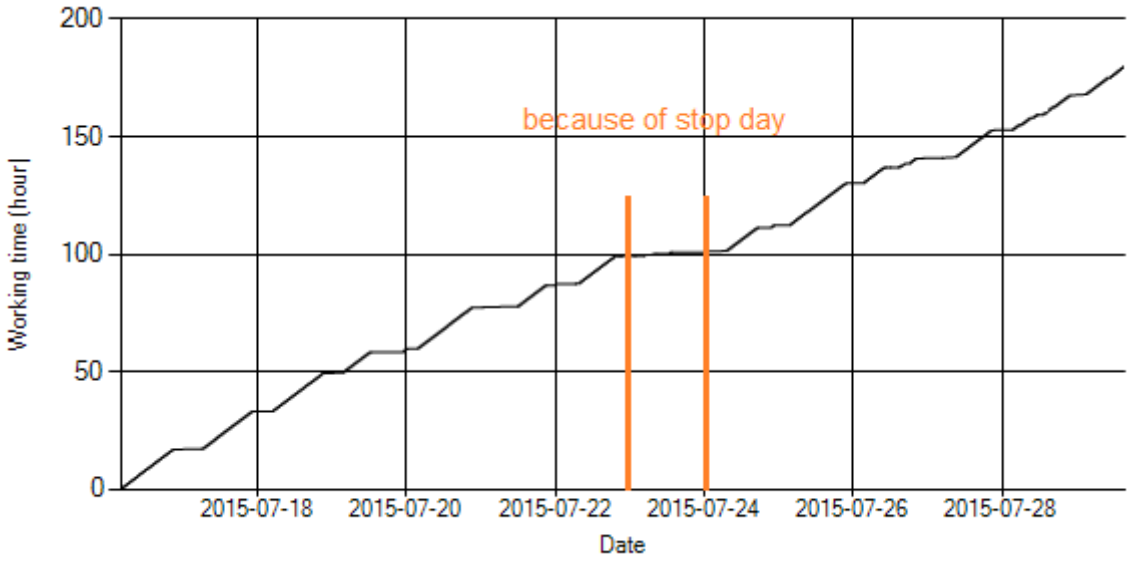


Figure 12- Time diagram for calculating CPK's working days

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 didn't sample on Jul 23rd due to stop day and on Jul 30th and 31st because of data logger problem.

Pressure-Engine Speed diagrams

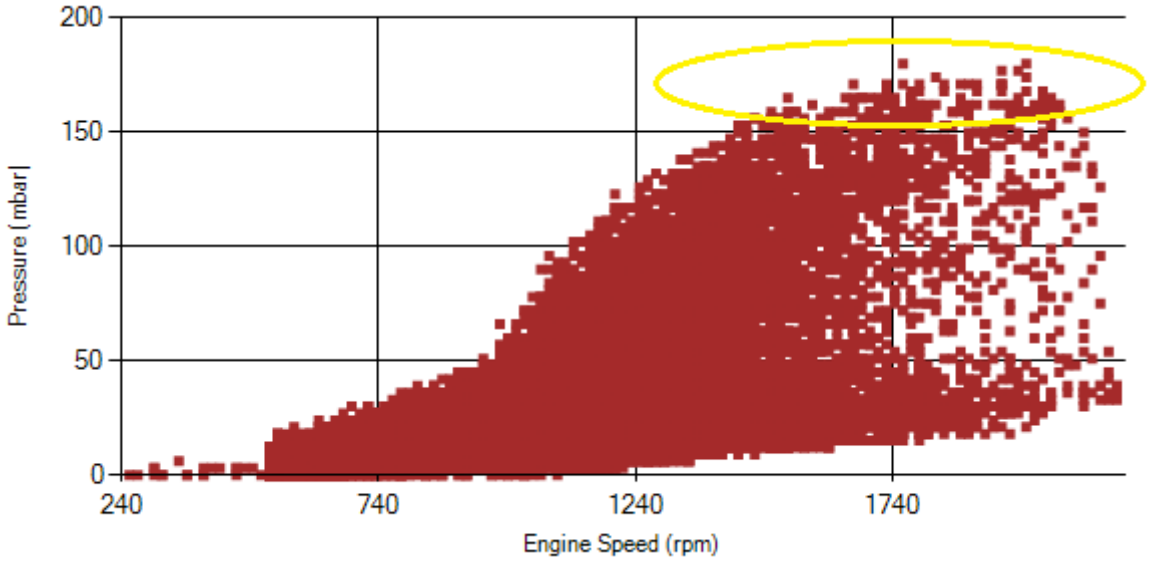


Figure 13- Pressure against engine speed

Notice: Yellow alarm (200>pressure>150) region was indicated in figure 13.

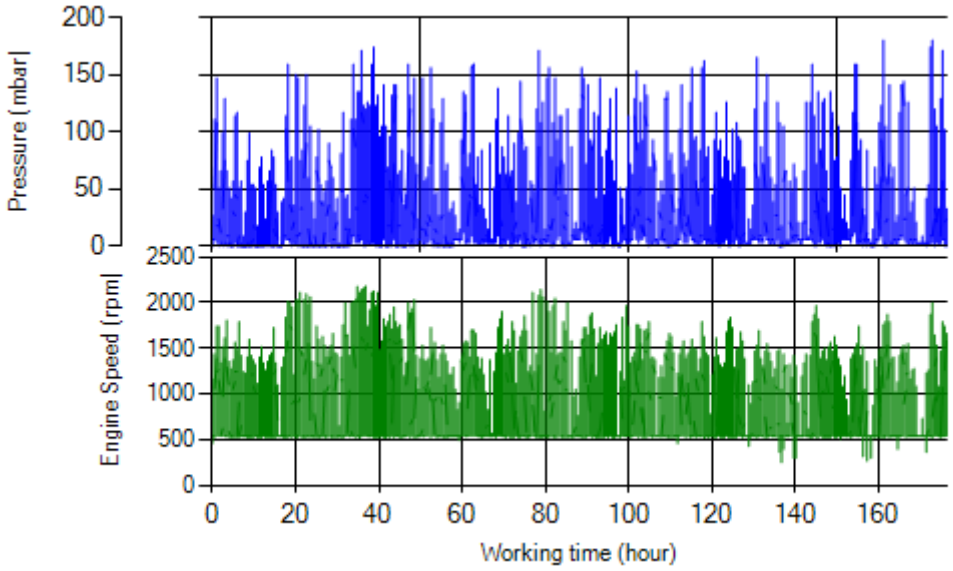


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

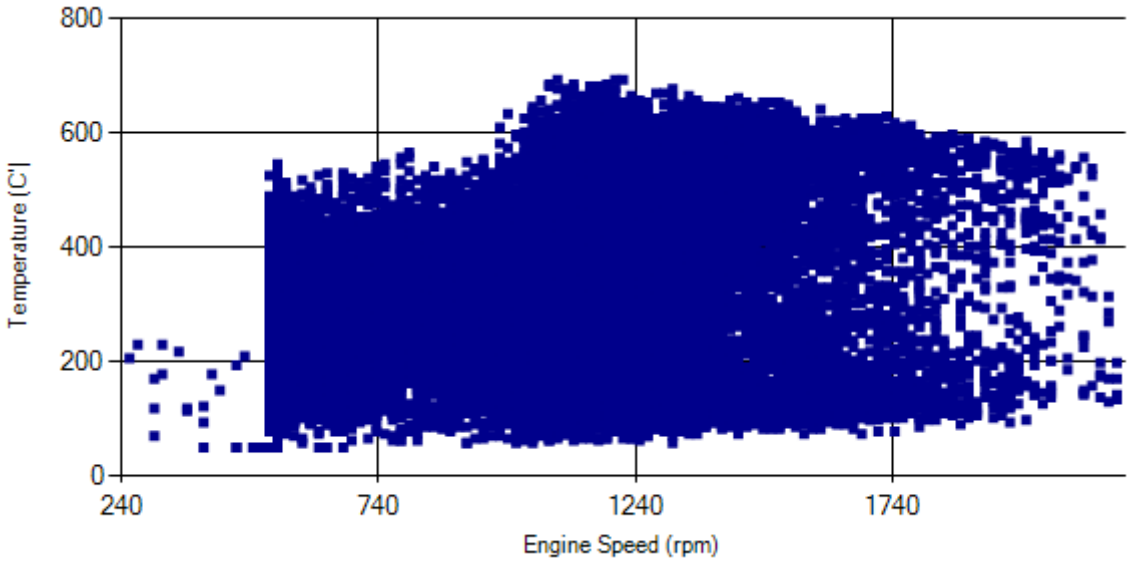


Figure 13- Temperature against engine speed

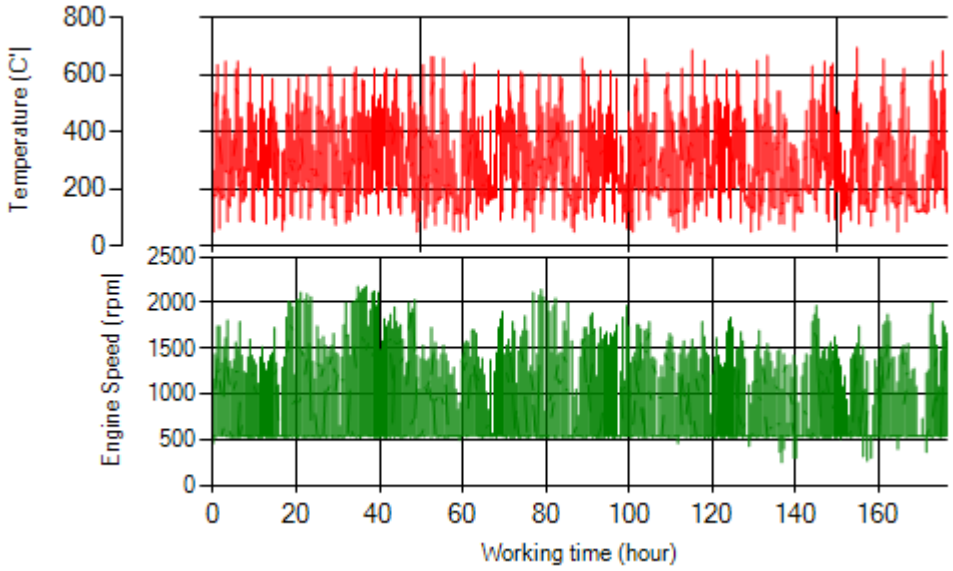


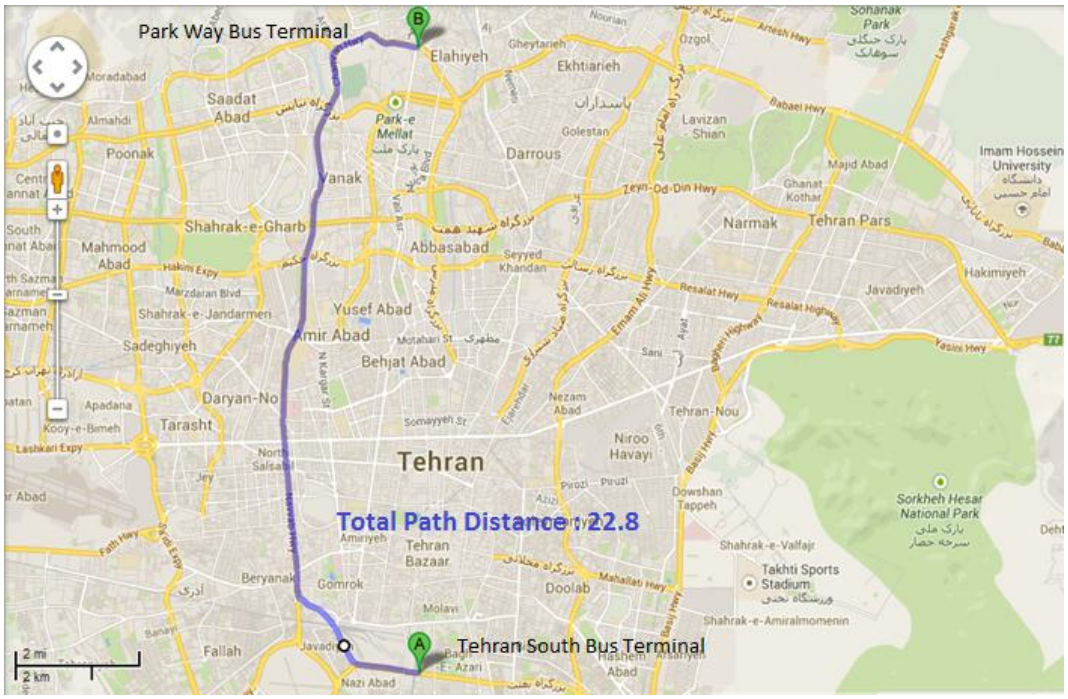
Figure 14- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.38% of total working time pressure is above 150 mbar and pressure above 200 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 °C and 26% above 350°C.
- Active regeneration beside high temperature distribution make this filter operate excellently.
- 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	1/Jul/2015 – 15/Jul/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 to 30% of its initial value on March February 15th

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	38276 km
Bus mileage over the period	2100 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	173 hour 6 minutes
Average working hours per day (including stop days)	11 hour 32 minutes
Bus average speed	$12.14\ \mathrm{km/hr}$[1]
Idle speed time to all working time ration	$60\ \%$[2]
Total Bus fuel consumption over the period	1302 lit
Fuel consumption per hour	7.53 lit/hr
Average fuel consumption	0.62 lit/km
Total Bus additive consumption over the period	0.339 lit
Average additive consumption	161 cc/km
Additive consumption to fuel ration	260 cc per 1000 lit (continuous dosing)

1-Due to engine maintenance, idle working ratio was high. So average speed was relatively low during this period.

2- Engine rotational speed for this vehicle when air conditioning system is on, is approximately 784 rpm and without use of cooling system is about 544 rpm.

Temperature, Pressure and Engine Speed Overview

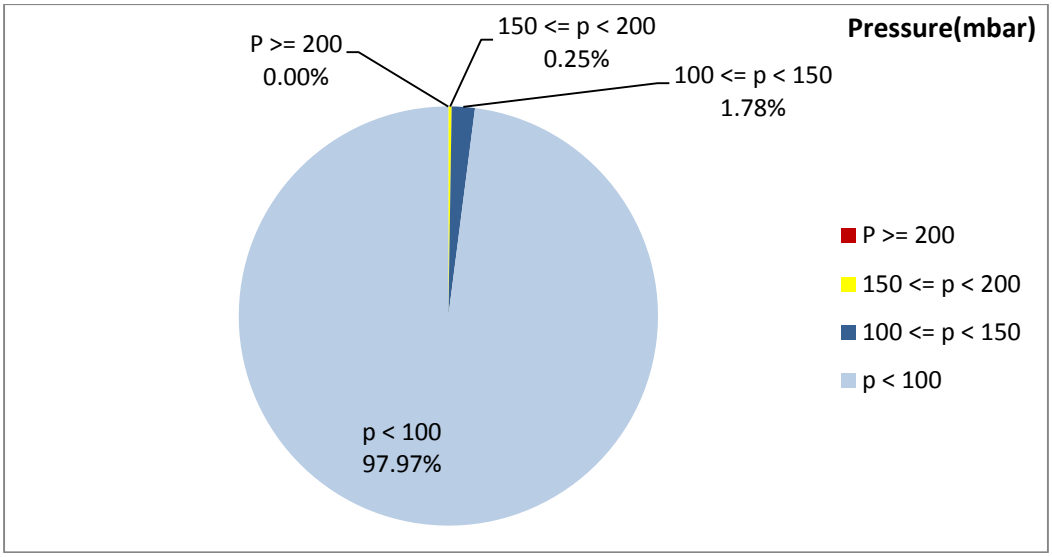


Figure 1- Pressure distribution over the working hours

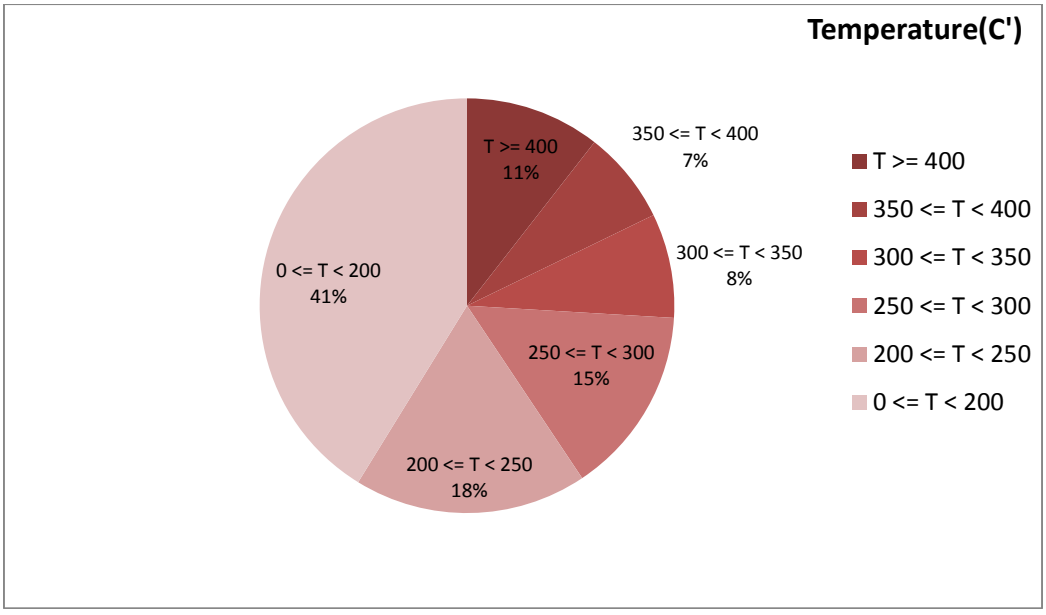


Figure 2-Temperature distribution over the working hours

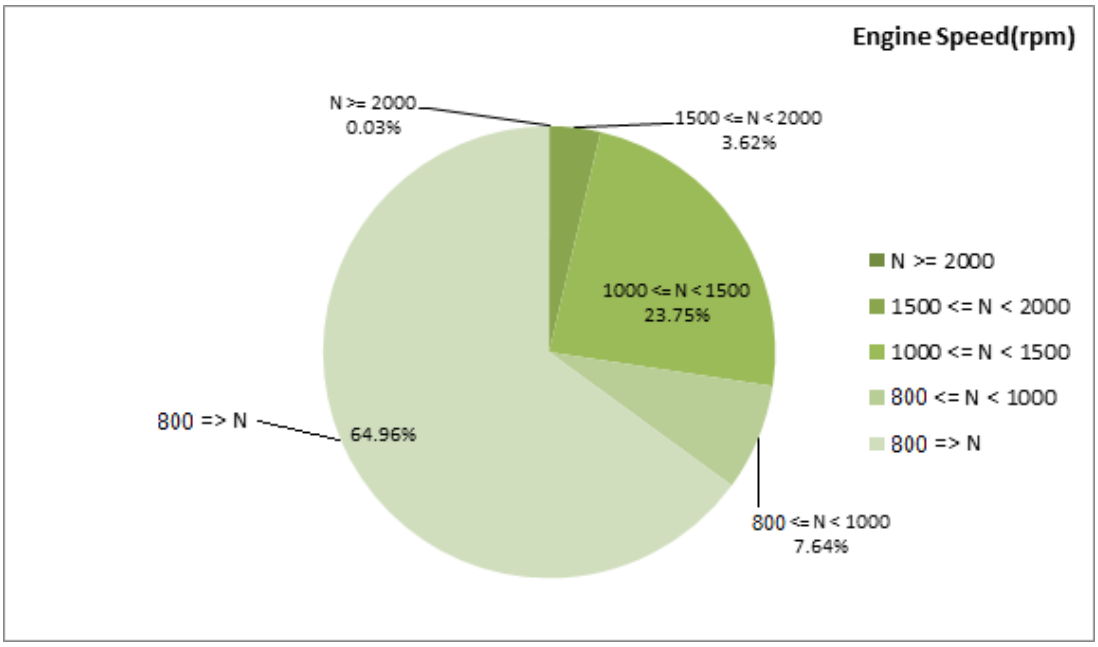


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
245.4	17.17	751

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
302.96	31.30	1027

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
562-50	198-0	2128-250

Detailed Pressure Analysis

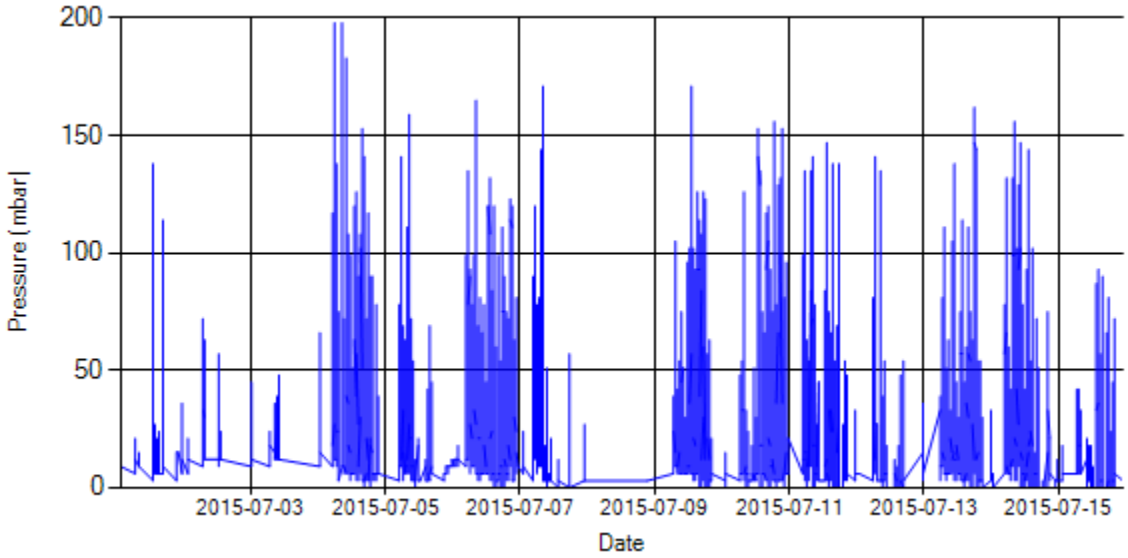


Figure 4- Pressure distribution over the period

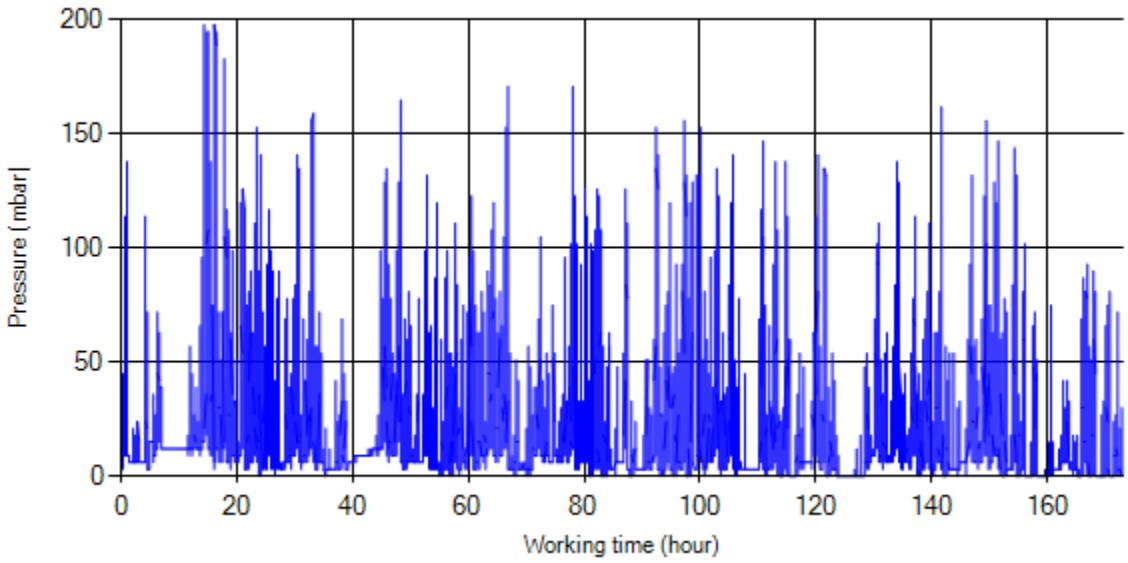


Figure 5- Pressure vs. working hours

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

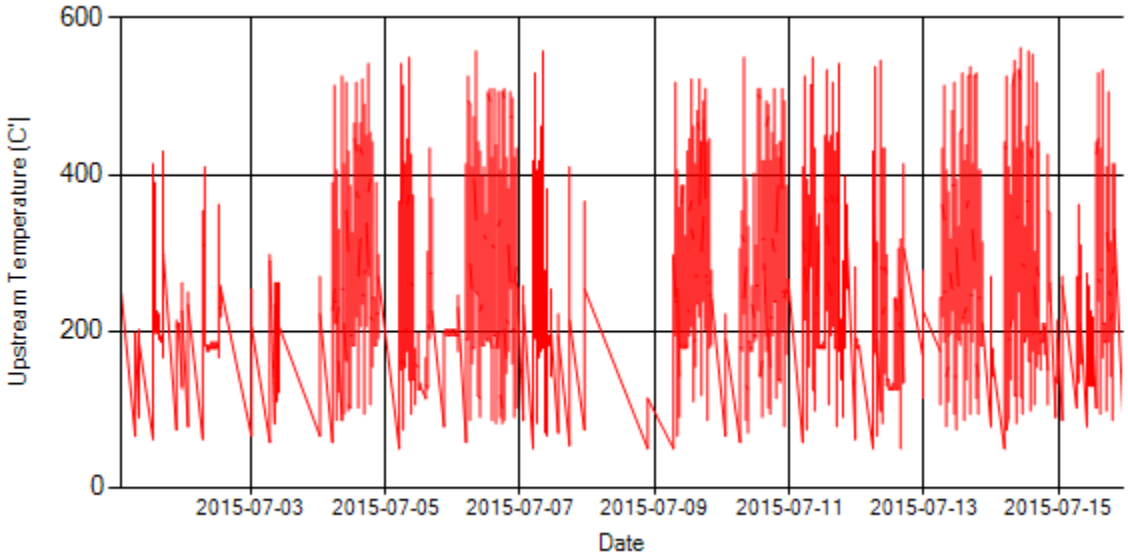


Figure 6- Temperature distribution over the period

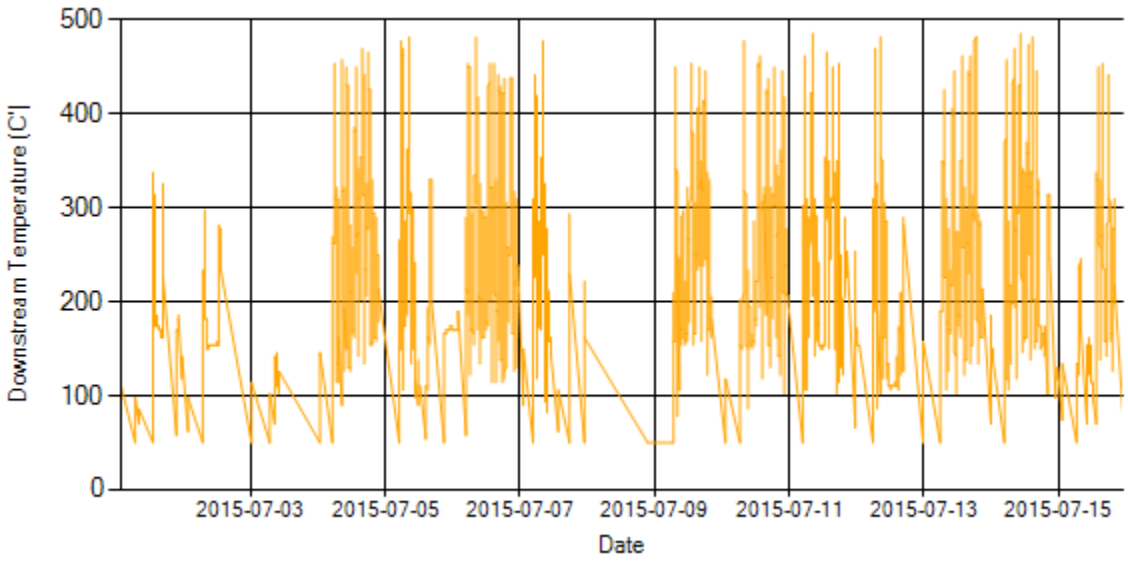


Figure 7- Temperature distribution over the period

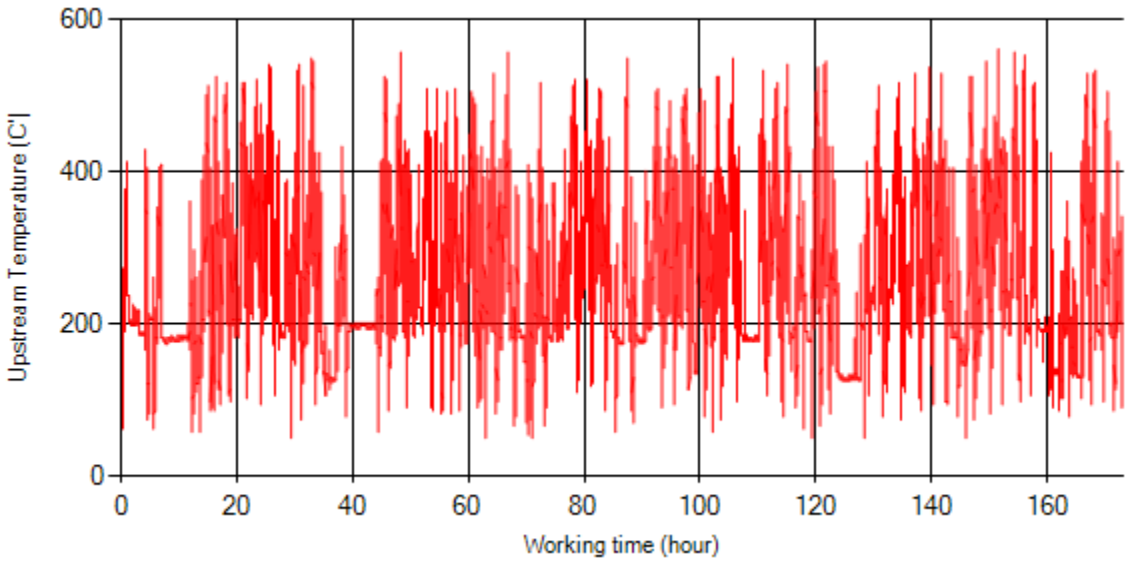


Figure 8- Temperature vs. working hours

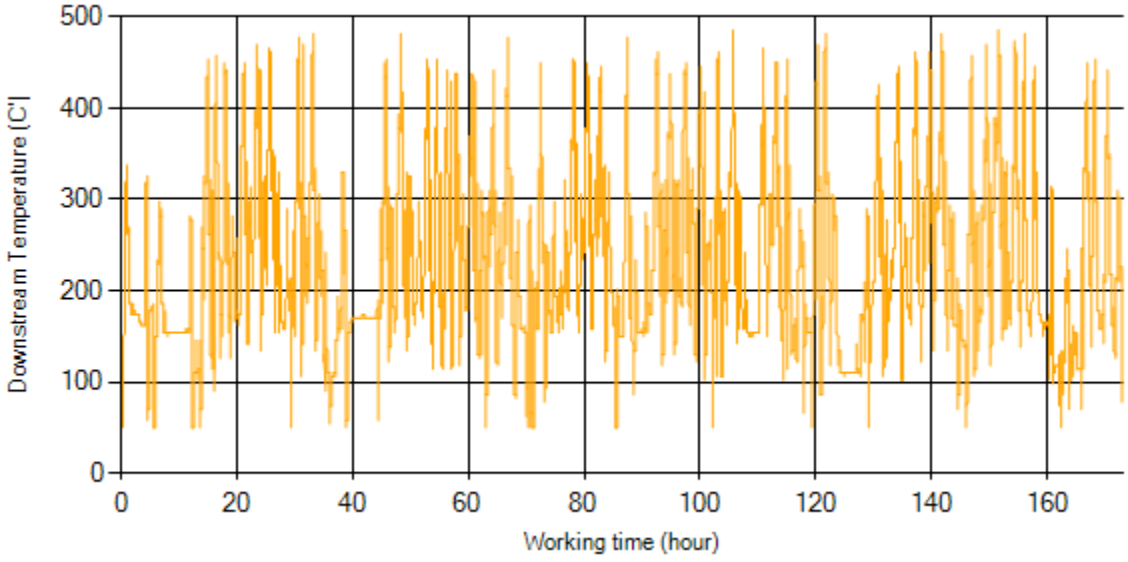


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

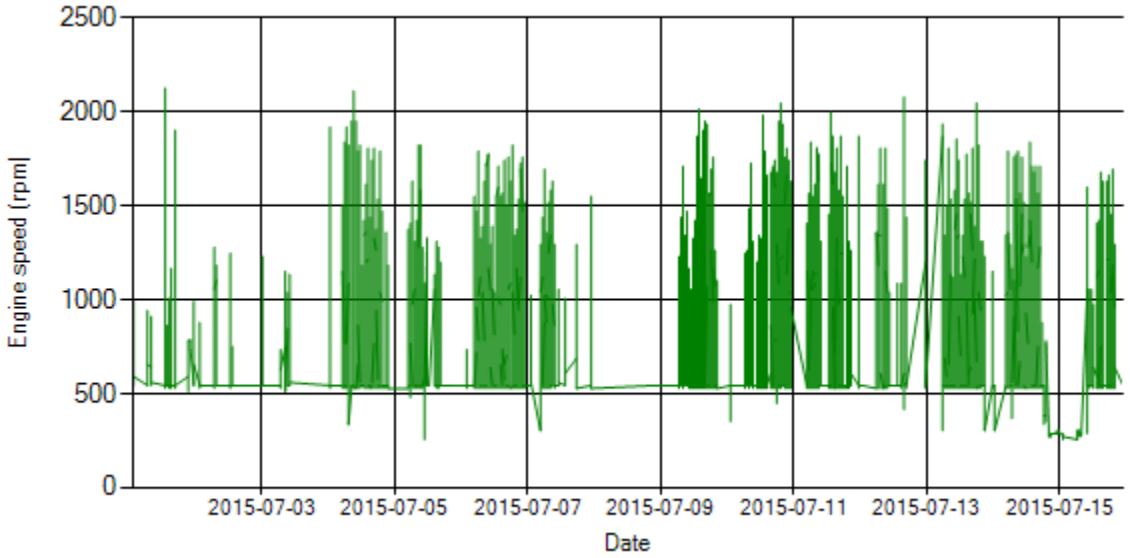


Figure 10- Engine speed distribution over the period

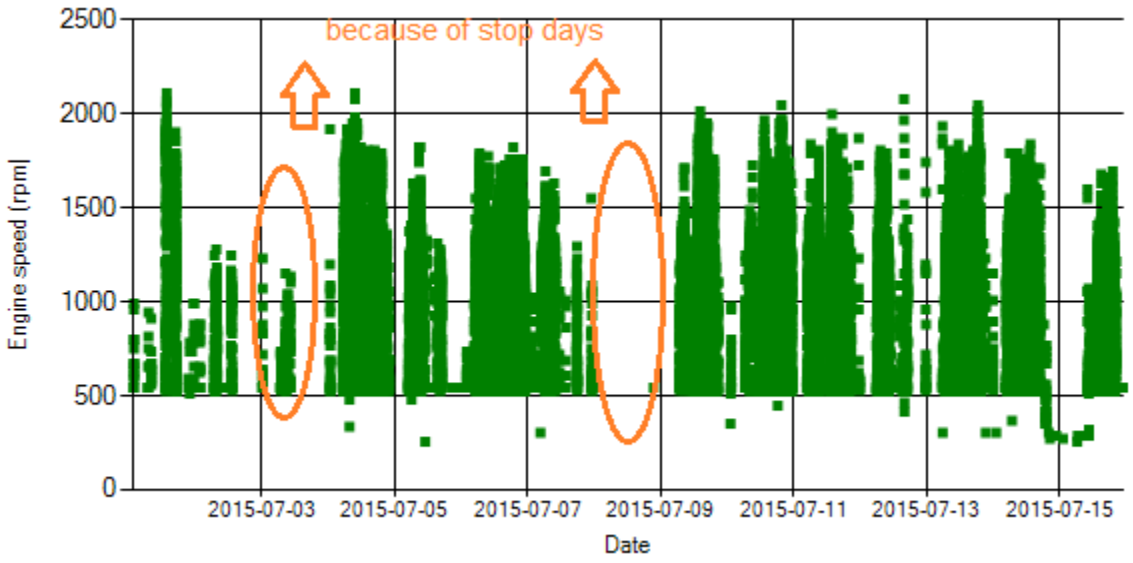


Figure 11- Engine speed diagram for calculating CPK's working days

Notice: Due to engine maintenance, idle working ratio was high on Jul 1st, 2nd and 3rd.

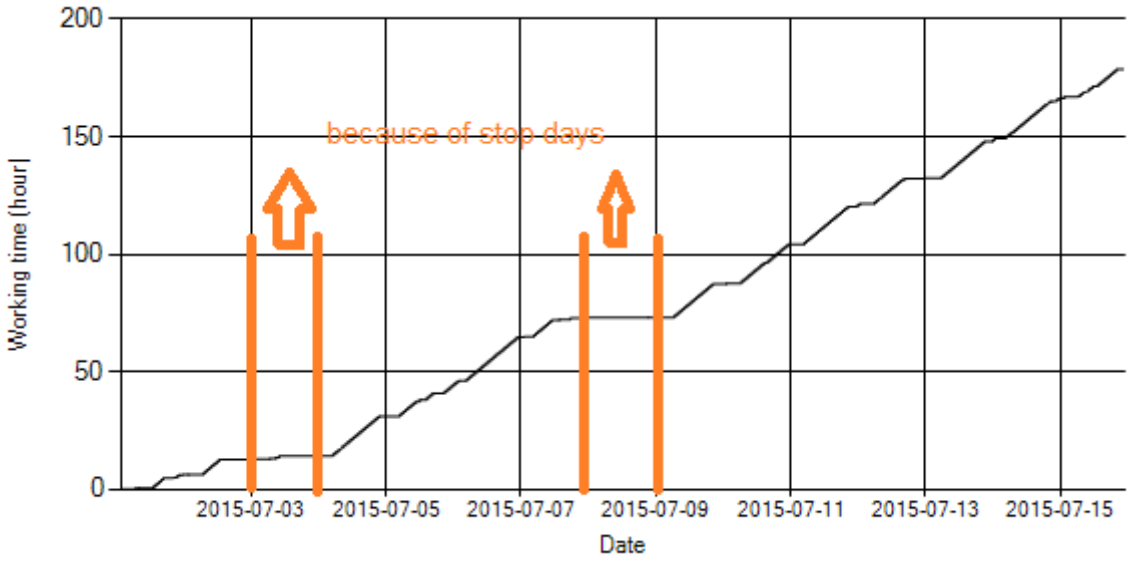


Figure 12- Time diagram for calculating CPK's working days

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 Jul 3rd and 8th because of stop days.

Pressure-Engine Speed diagrams

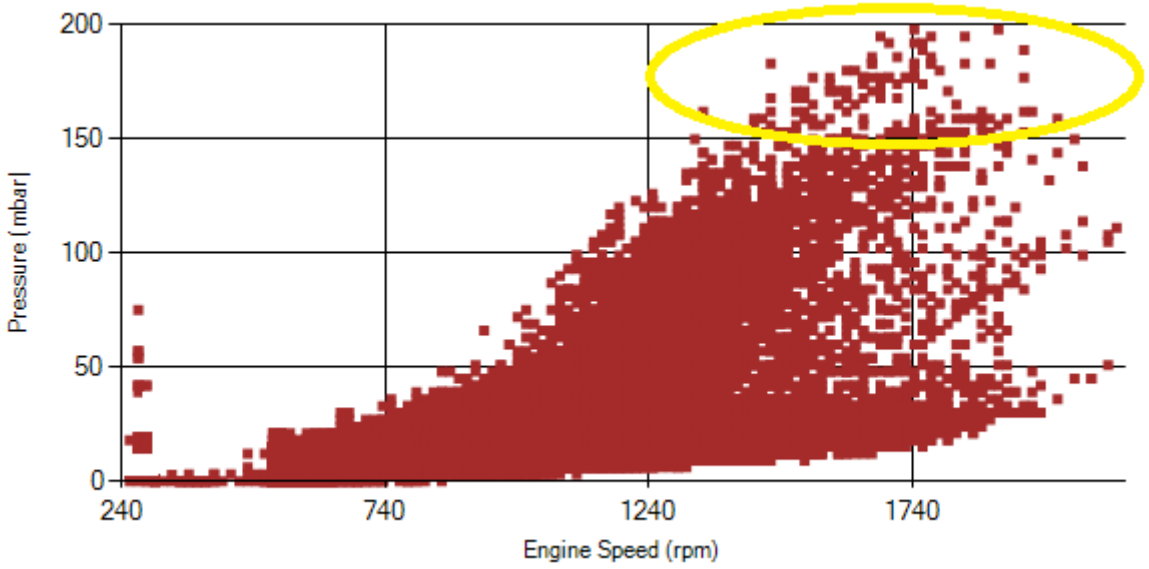


Figure 13- Pressure against engine speed

Notice: Yellow alarm (200>pressure>150) region was indicated in figure 13.

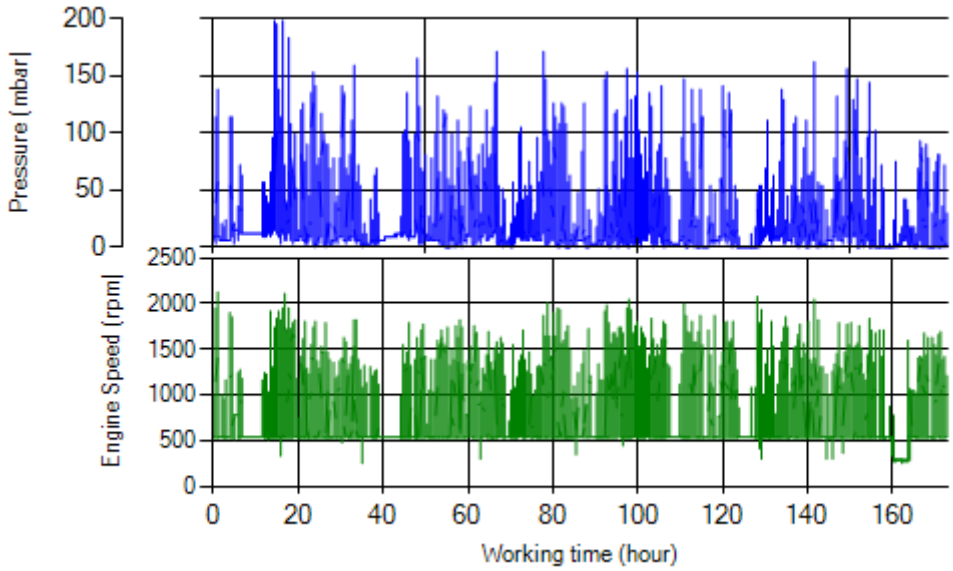


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

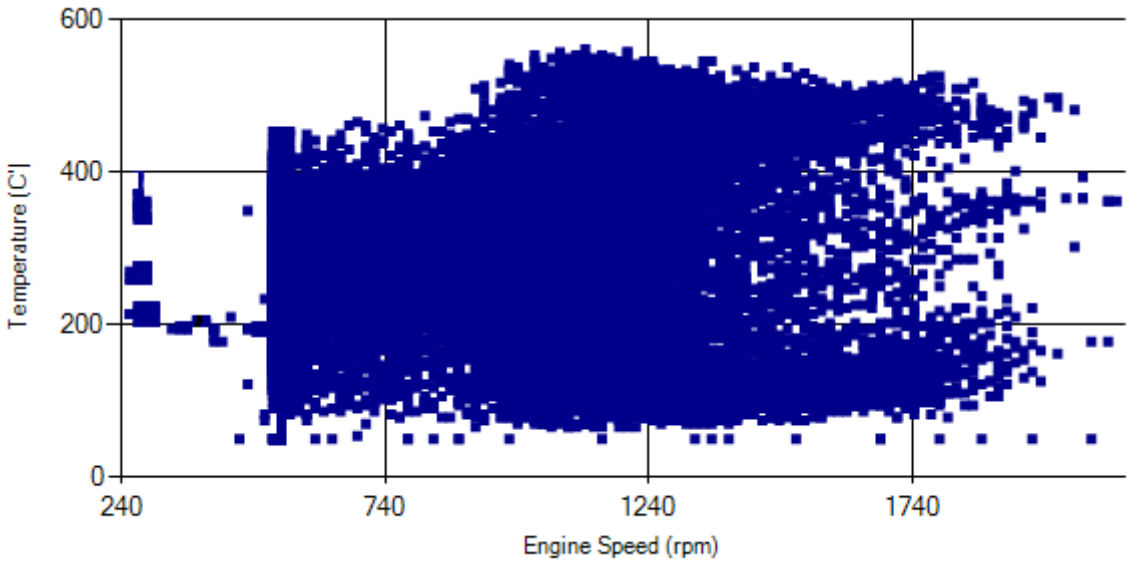


Figure 15- Temperature against engine speed

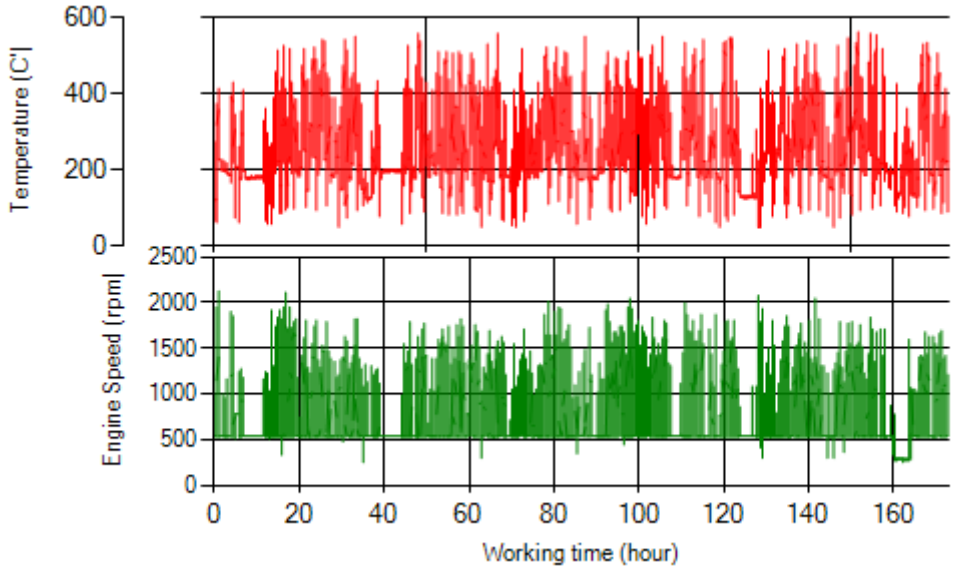


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, pressure above 200 mbar can't be seen and only 0.25% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. 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☐

ASA Azmoon Sanat Arvin	Document Number: DPF2015072/1 Date: 15/Aug/2015

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	16/Jun/2015 – 31/Jun/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 to 30% of its initial value on March February 15th

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	40308 km
Bus mileage over the period	2032 km
Working days over the period	11 days
Stop days	5 days
Data logger working days	11 days
Working hours over the period	145 Hour 12 minutes
Average working hours per day (including stop days)	9Hour 4 minutes
Bus average speed	14 km/hr
idle speed time to all working time ration	58 %
Total Bus fuel consumption over the period	1321 lit
Fuel consumption per hour	9.09 lit/hr
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	0.343 lit
Average additive consumption	169 cc/km
Additive consumption to fuel ration	260 cc per 1000 lit (continuous dosing)

Engine rotational speed for this vehicle when air conditioning system is on, is approximately 784 rpm and without use of cooling system is about 544 rpm.

Temperature, Pressure and Engine Speed Overview

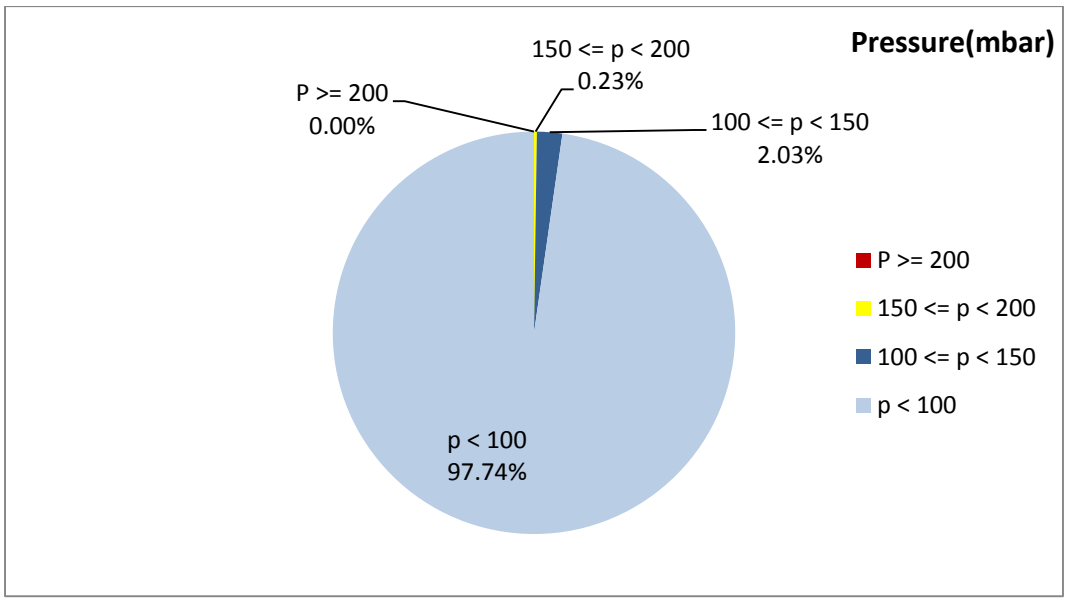


Figure 1- Pressure distribution over the working hours

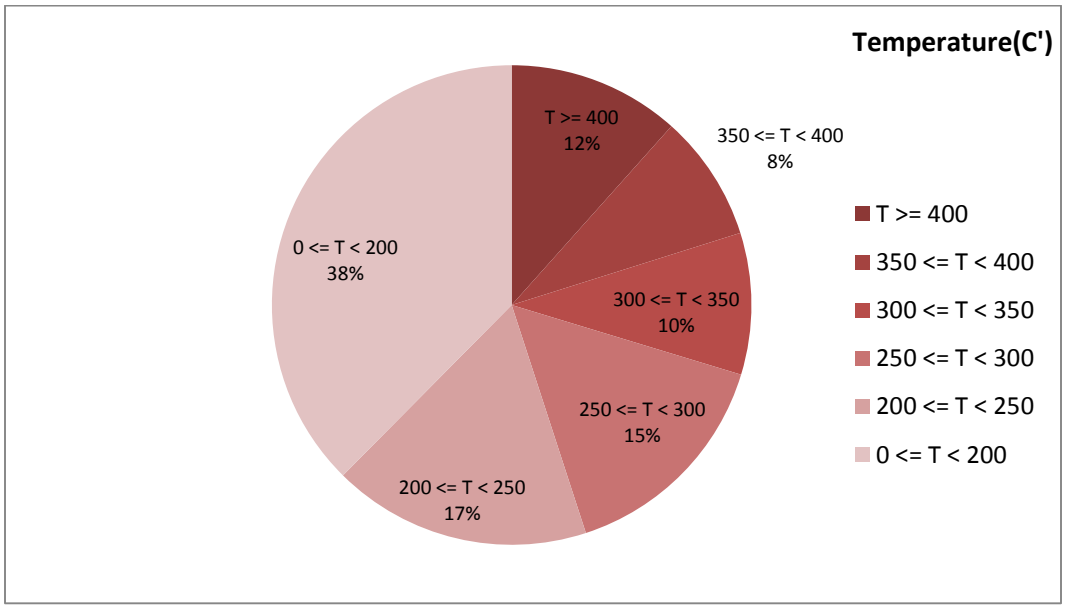


Figure 2-Temperature distribution over the working hours

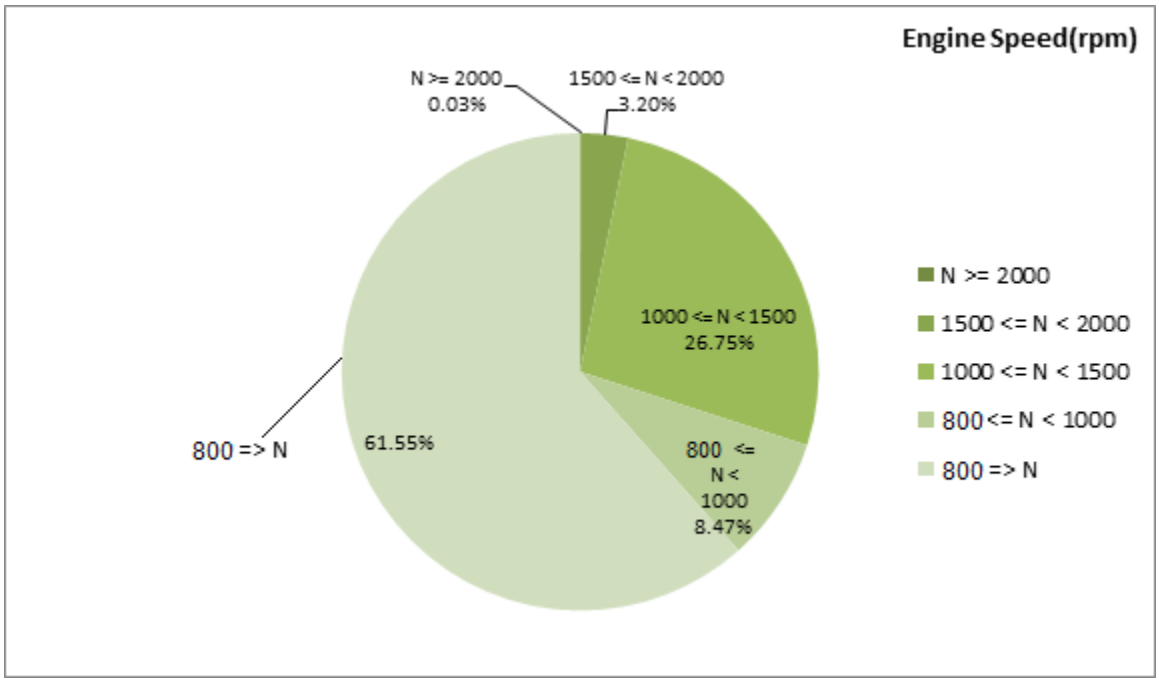


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
255.65	18.05	787

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
312.60	32.83	1058

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
566-50	195-0	2128-256

Detailed Pressure Analysis

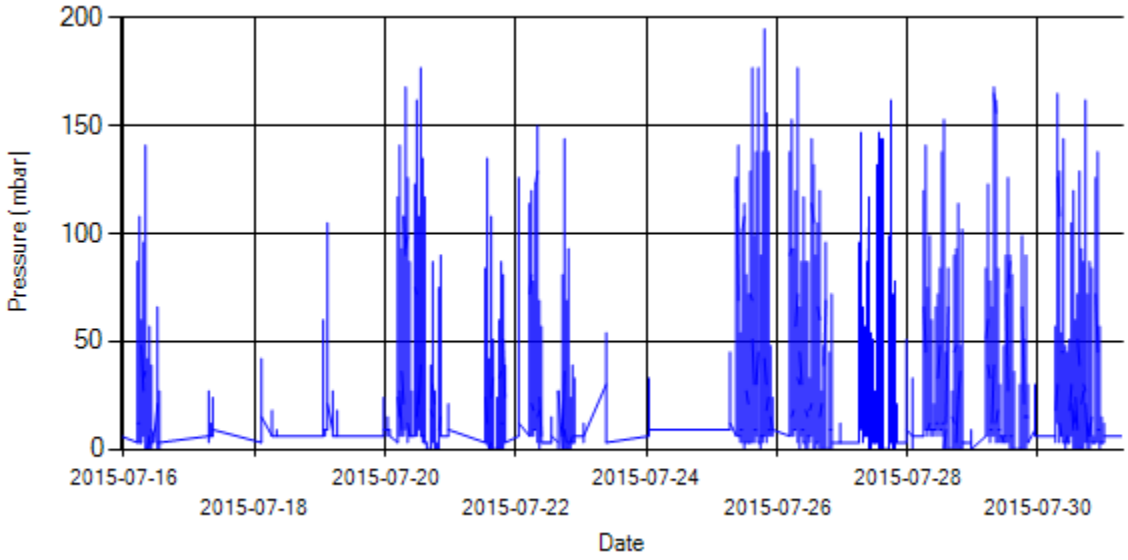


Figure 4- Pressure distribution over the period

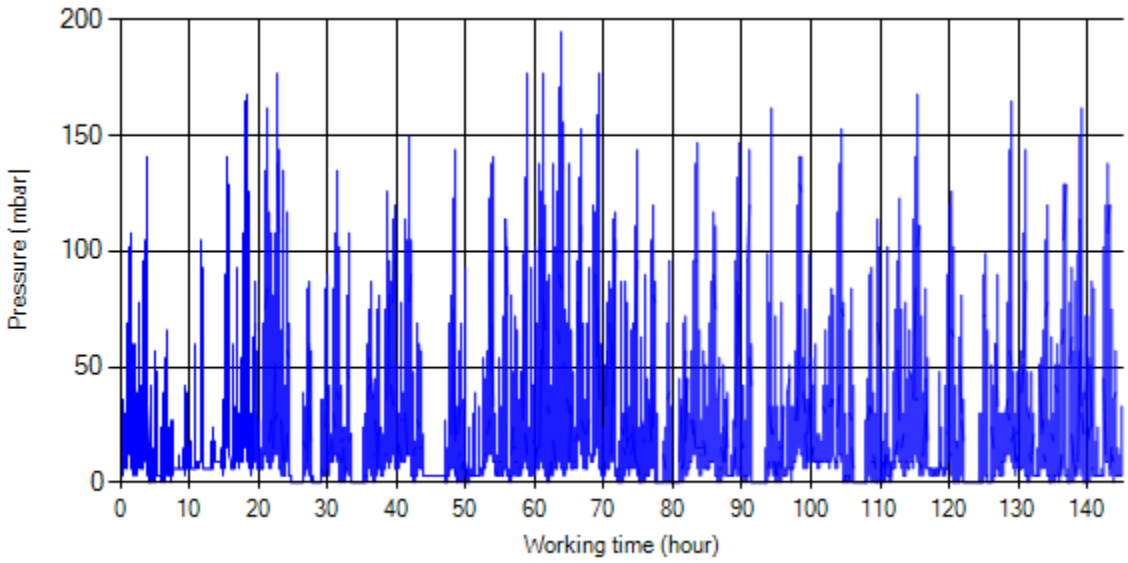


Figure 5- Pressure vs. working hours

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

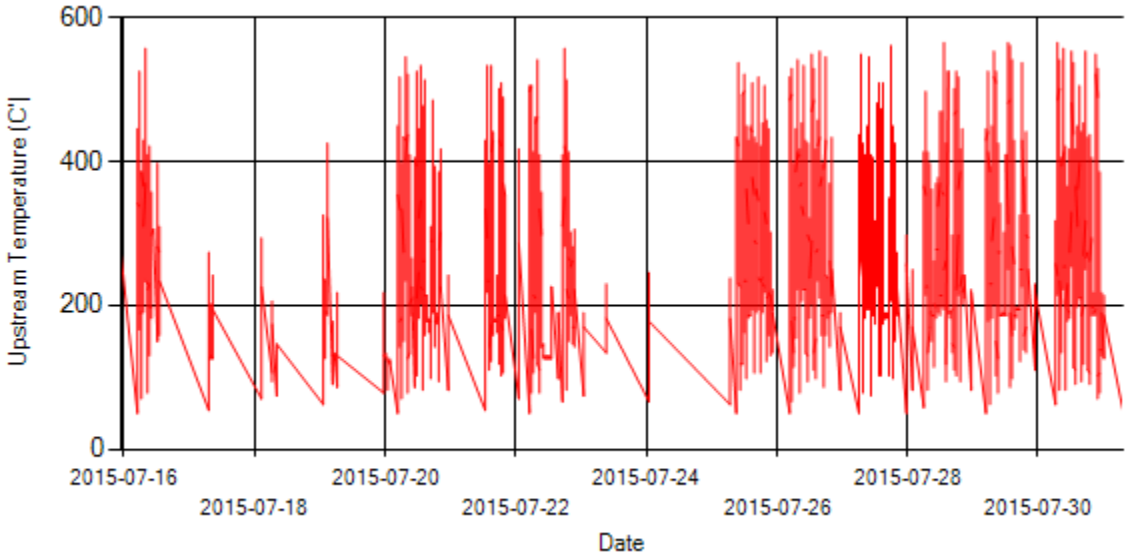


Figure 6- Temperature distribution over the period

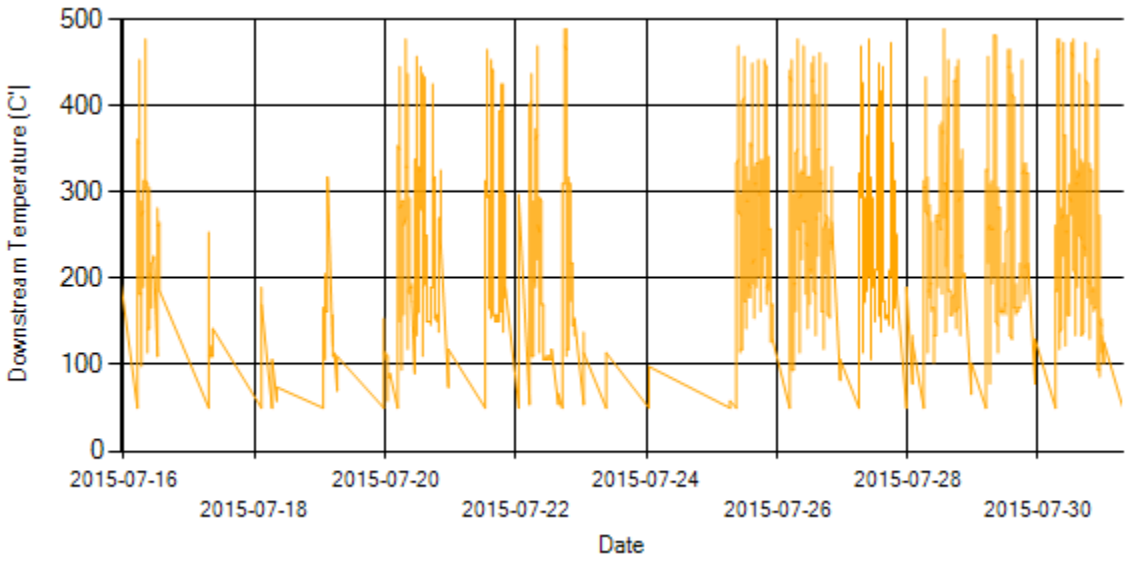


Figure 7- Temperature distribution over the period

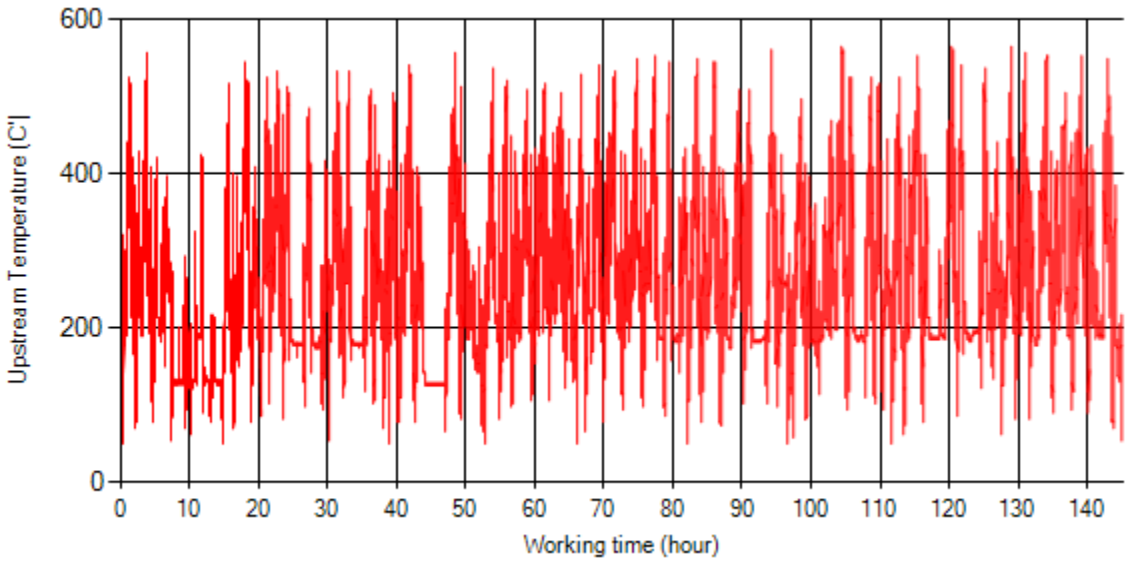


Figure 8- Temperature vs. working hours

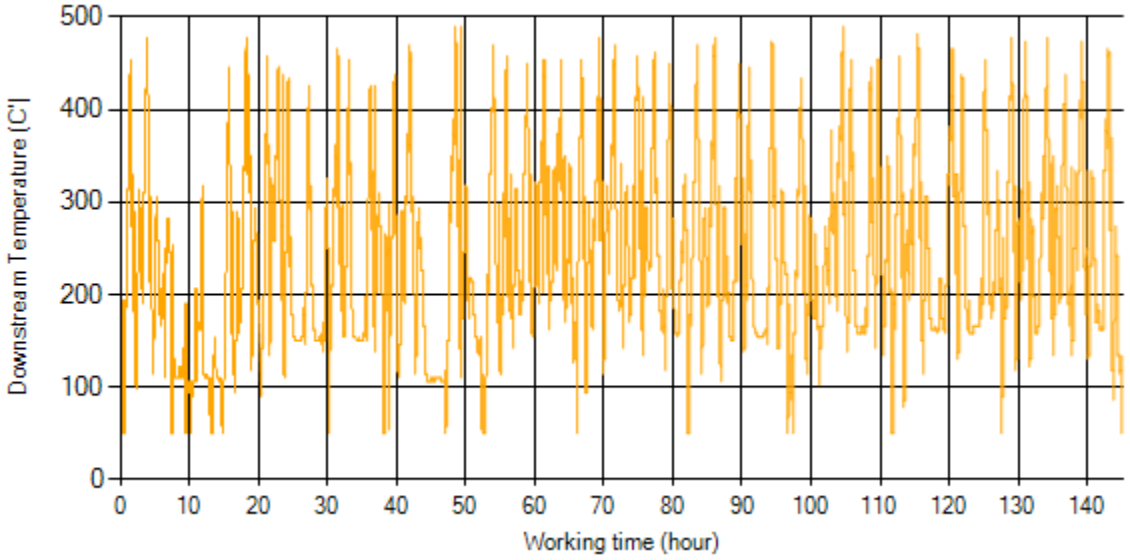


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

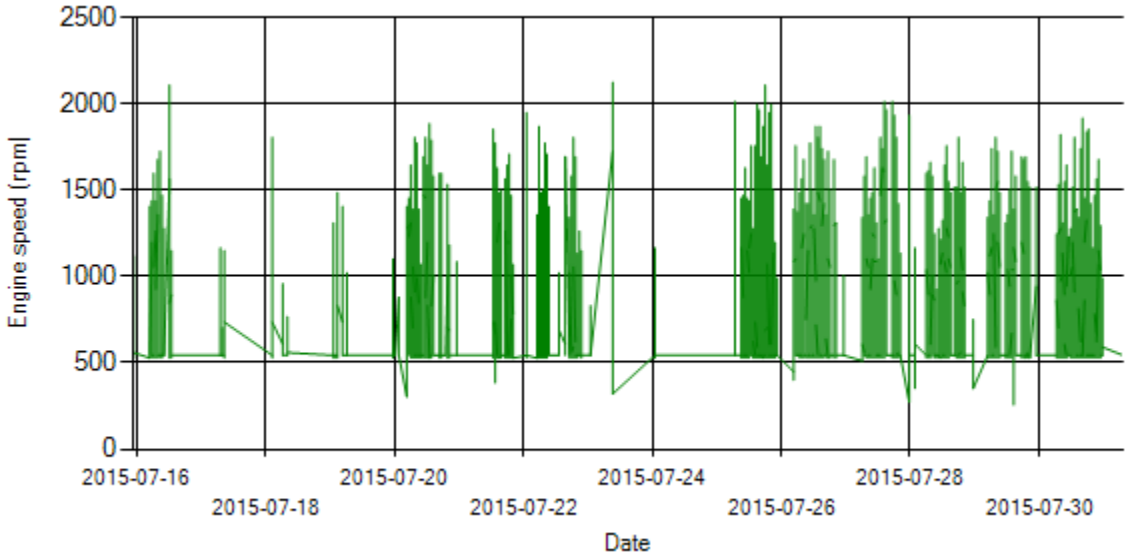


Figure 10- Engine speed distribution over the period

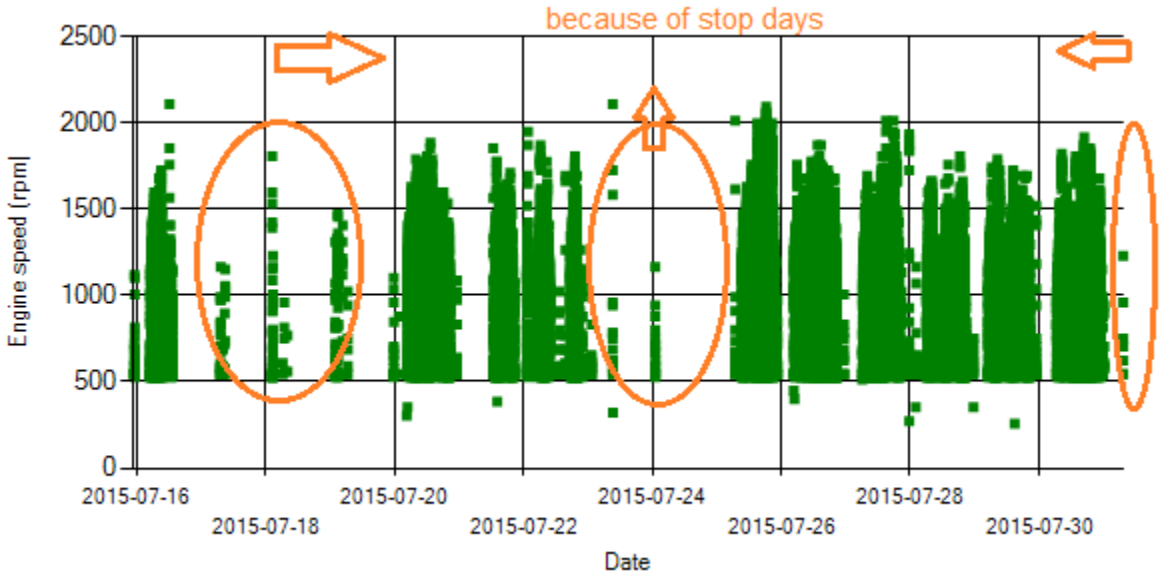


Figure 11- Engine speed diagram for calculating CPK's working days

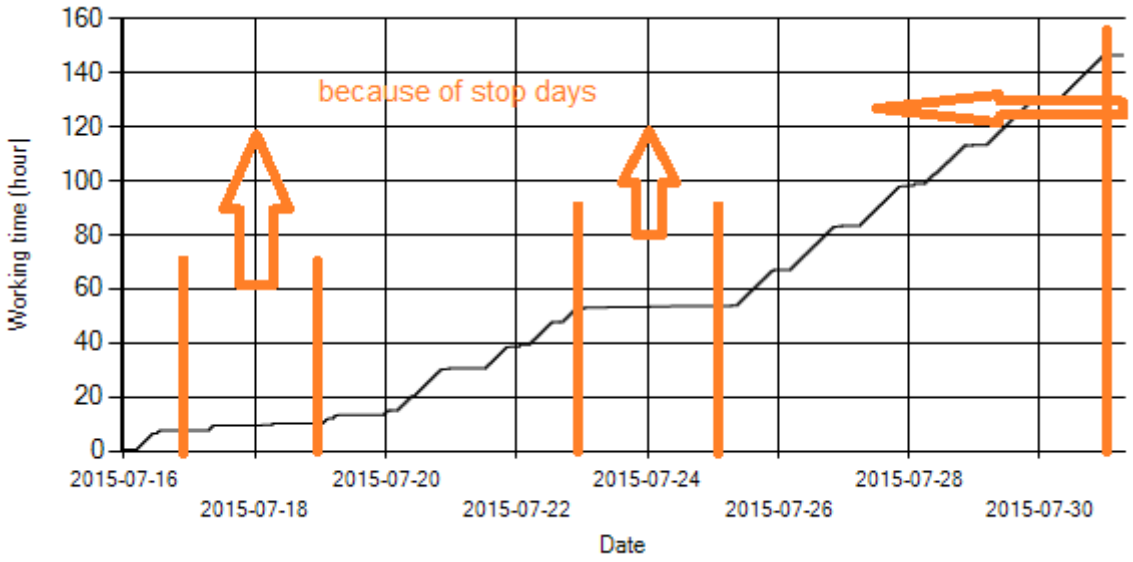


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

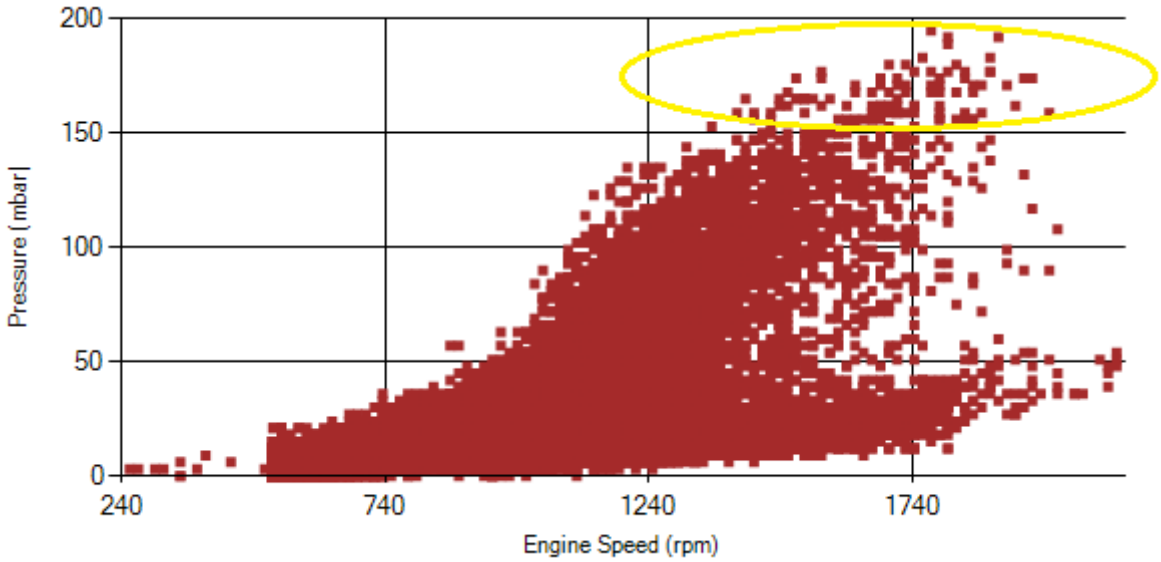


Figure 13- Pressure against engine speed

Notice: Yellow alarm (200>pressure>150) region was indicated in figure 13.

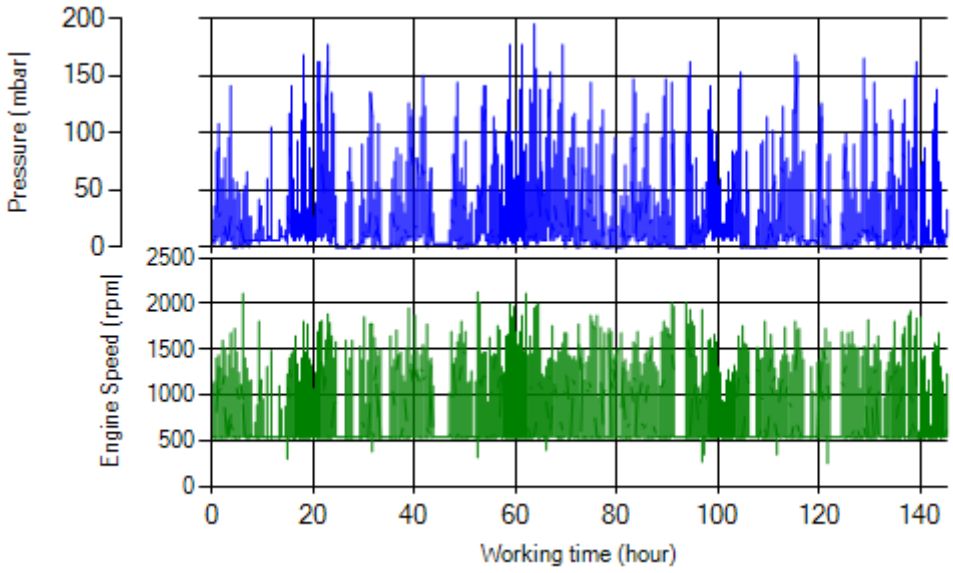


Figure 14- P,N distribution vs. working hours

Temperature-Engine Speed diagrams

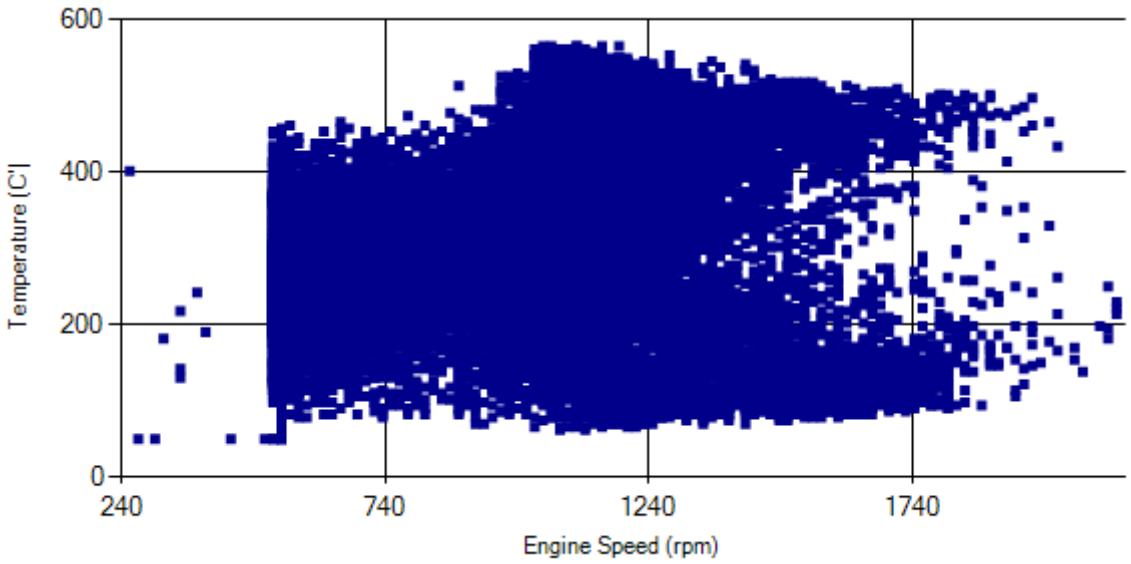


Figure 15- Temperature against engine speed

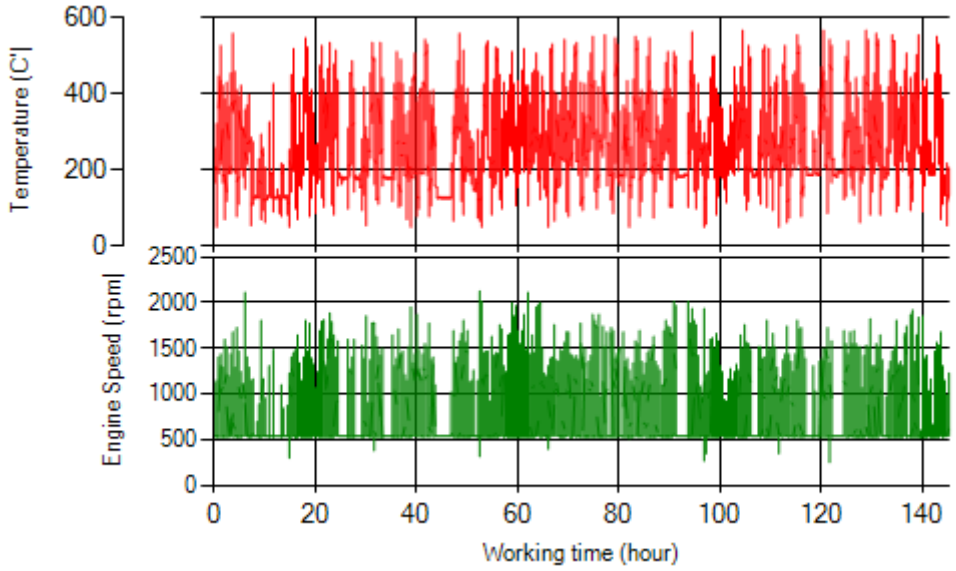


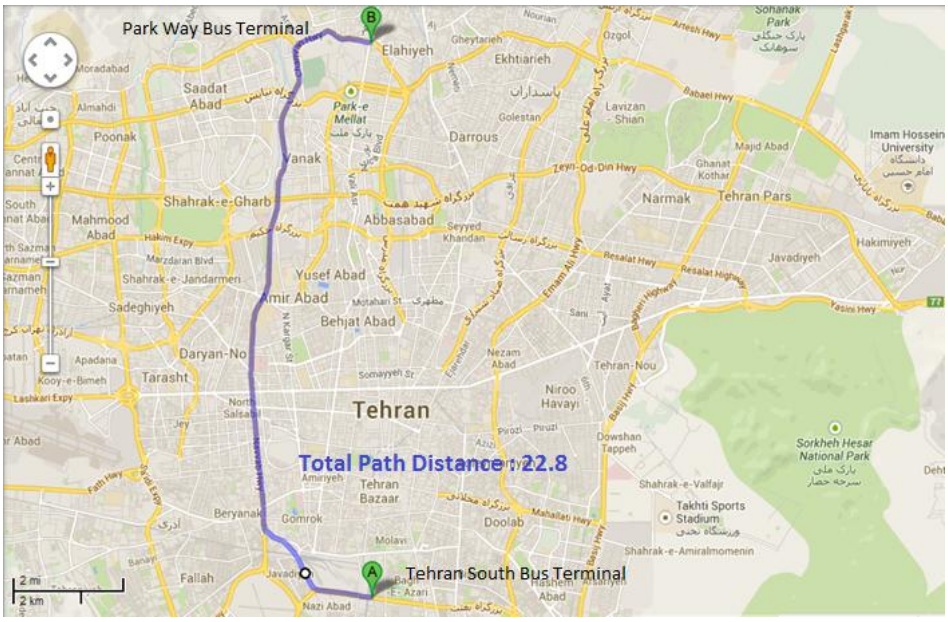
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, pressure above 200 mbar can't be seen and only 0.23% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 12% of total working time, temperature is above 400 ℃ and 20% 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)



Notice: This system had bus electrical and RPM sensor problem during this period. So please consider notifications to get correct information.

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/Jul/2015 – 15/Jul/2015 (fifteen days)
K value - DPF upstream	1.83 [1/m]
K value – DPF downstream	0.06 [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)	24018 km
Bus mileage over the period	3321 km
Working days over the period	-
Stop days	-
Data logger working days	3 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	-
Total Bus fuel consumption over the period	2192 lit
Fuel consumption per hour	-
Average fuel consumption	0.66 lit/km
Total Bus additive consumption over the period	1.096 lit
Average additive consumption	330 cc/km
Additive consumption to fuel ration	500 cc per 1000 lit (batch dosing with tank level)

Notice: Bus electrical system had problem during this period and was fixed on Jul 13th. So DPF information missed from Jul 1st to 12th. But fortunately data of last three days (**13th, 14th, 15th**) were fully reliable and filter operation status can be probed.

Temperature, Pressure and Engine Speed Overview

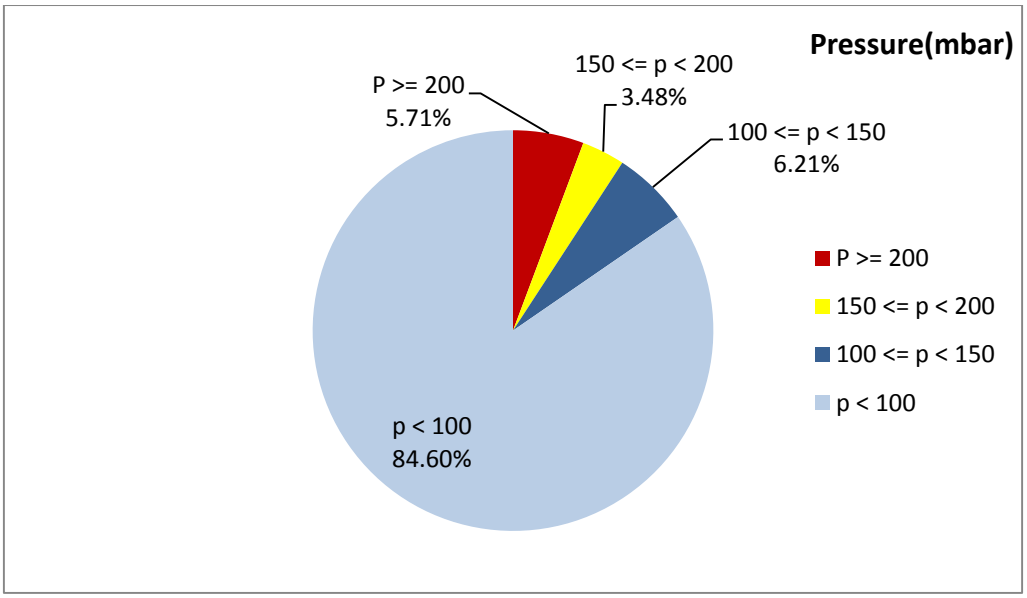


Figure 1- Pressure distribution over the working hours

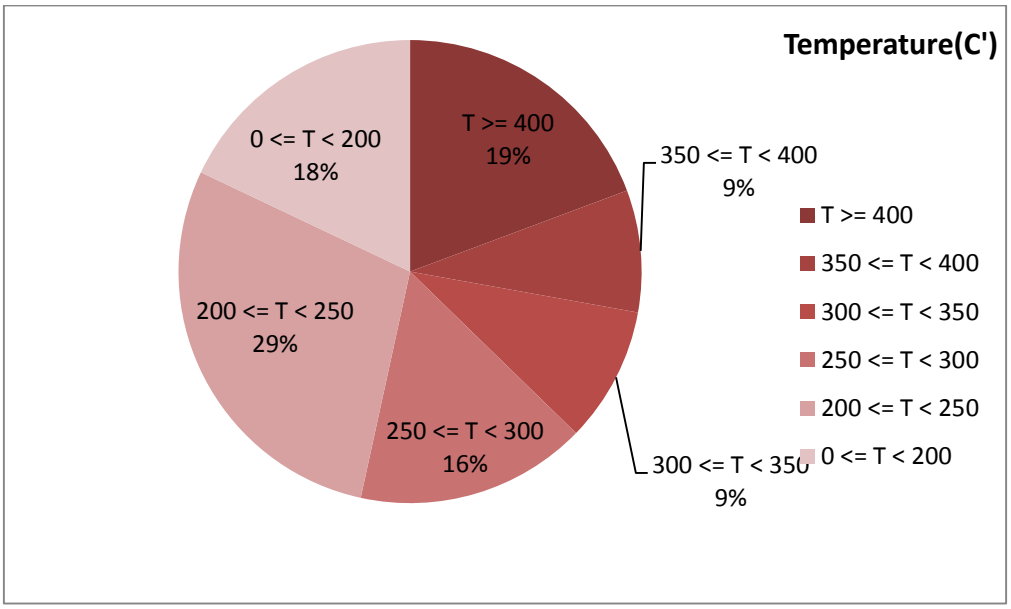


Figure 2-Temperature distribution over the working hours

Notice: figures 1 and 2 belong to data logger working days (13th, 14th, 15th).

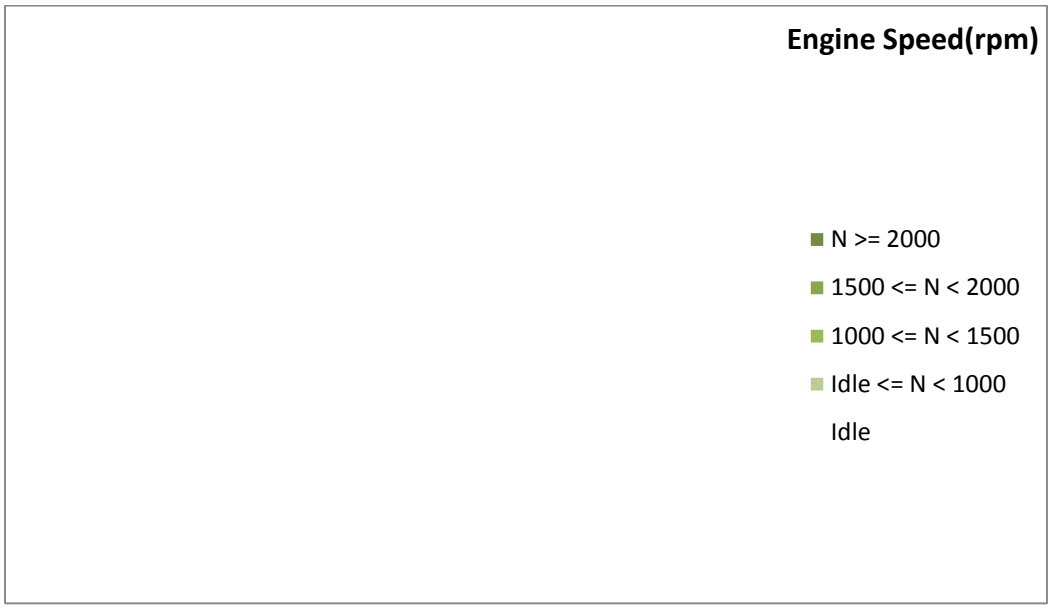


Figure 3- Engine speed distribution over the working hours

Notice: RPM sensor problem that happened on Jul 7th, so all data about engine speed missed. Due to data logger and RPM sensor problems, engine speed data missed.

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
293.27	57.58	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
324.12	64.84	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
654-50	390-0	-

Notice: Tables 4, 2 and 3 belong to data logger working days (13th, 14th, 15th). Also table 5 was calculated by temperature's data.

Detailed Pressure Analysis

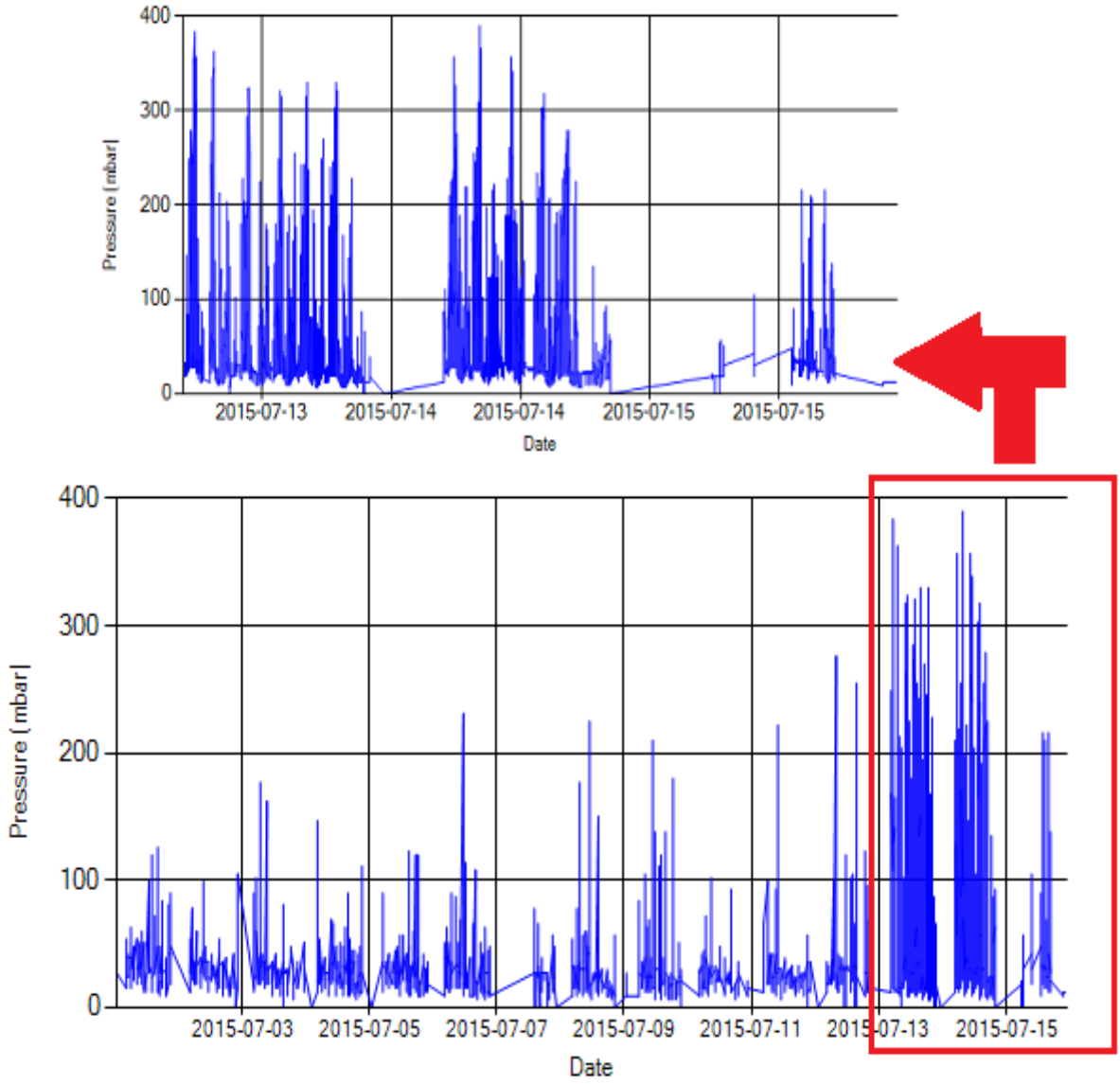


Figure 4- Pressure distribution over the period

Notice: Data logger electrical problem was fixed on Jul 13rd. So only reliable data are data logger working days (13th, 14th, 15th).

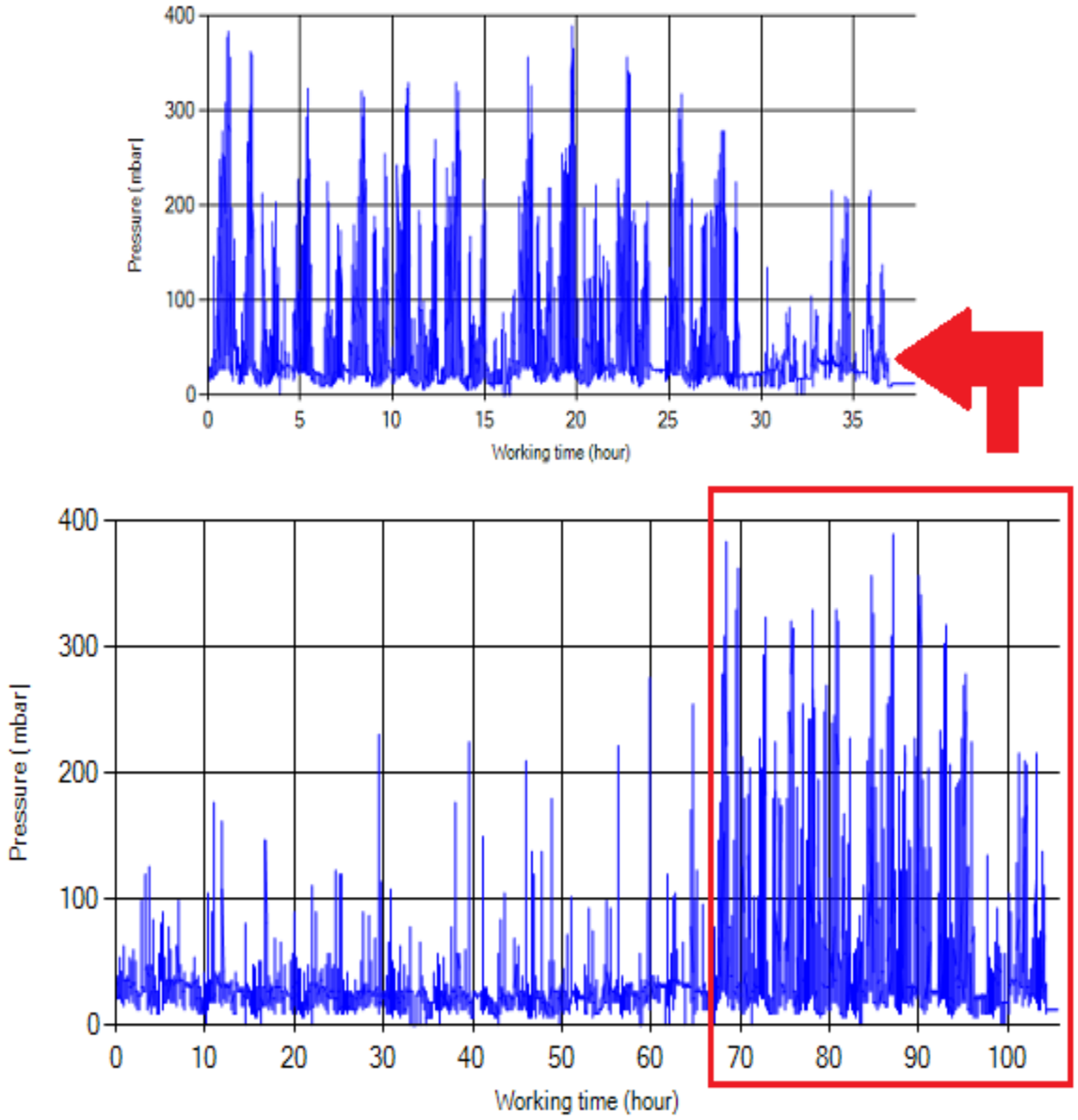


Figure 5- Pressure vs. working hours

Notice: Data logger electrical problem was fixed on Jul 13rd. So only reliable data are data logger working days (13^{th}, 14^{th}, 15^{th}).

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

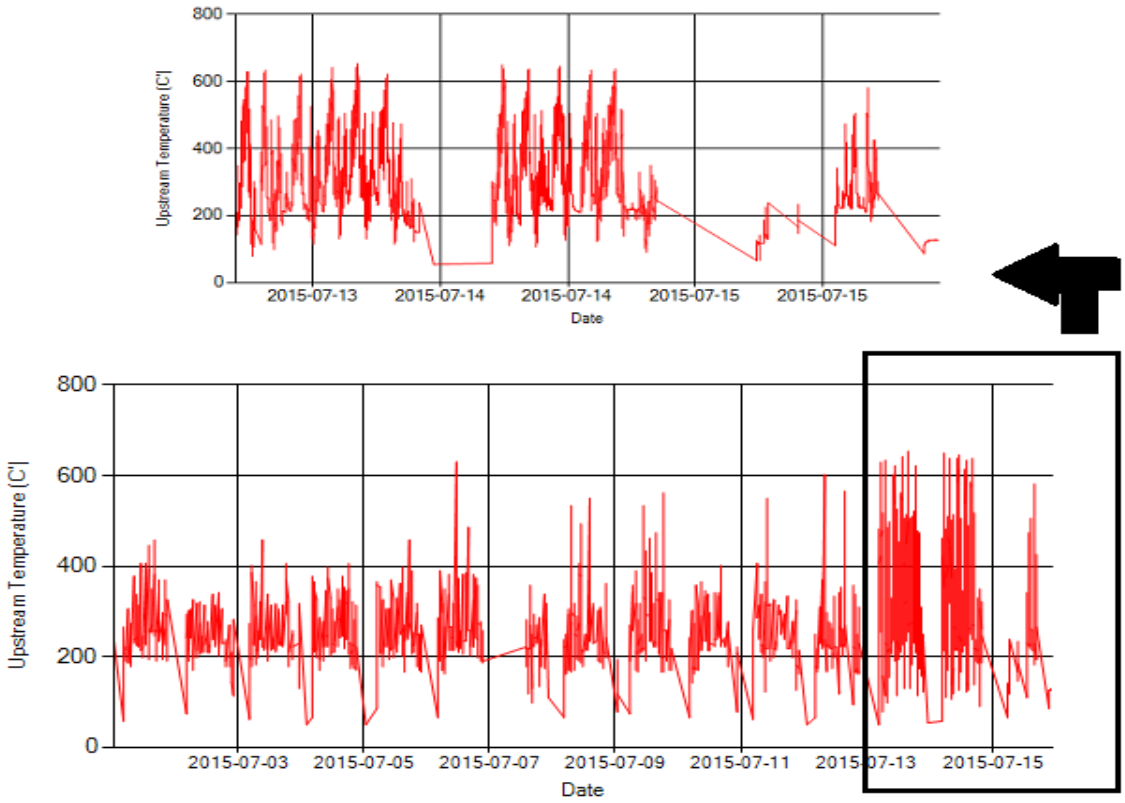


Figure 6- Temperature distribution over the period

Notice: Data logger electrical problem was fixed on Jul 13th. So only reliable data are data logger working days (13th, 14th, 15th).

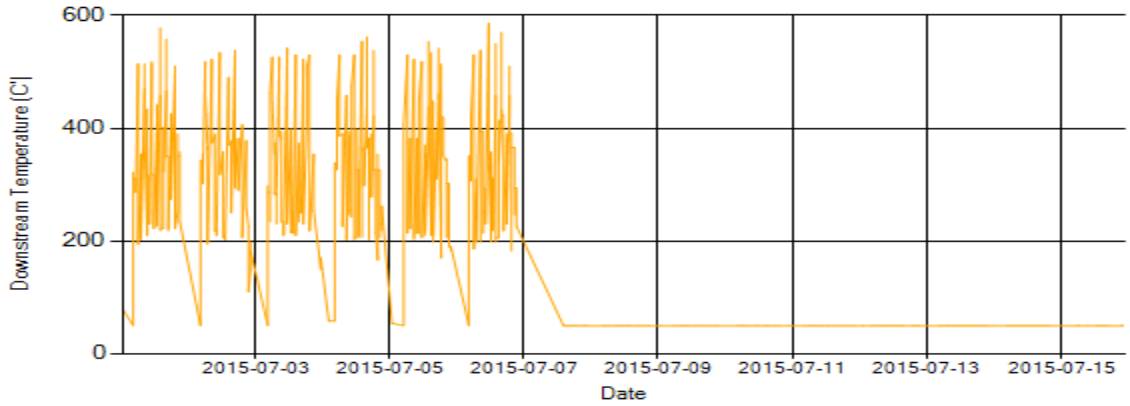


Figure 7- Temperature distribution over the period

Notice: As depicted in Figure 7, temp 2 data have been missed because of sensor problem since Jul 7th.

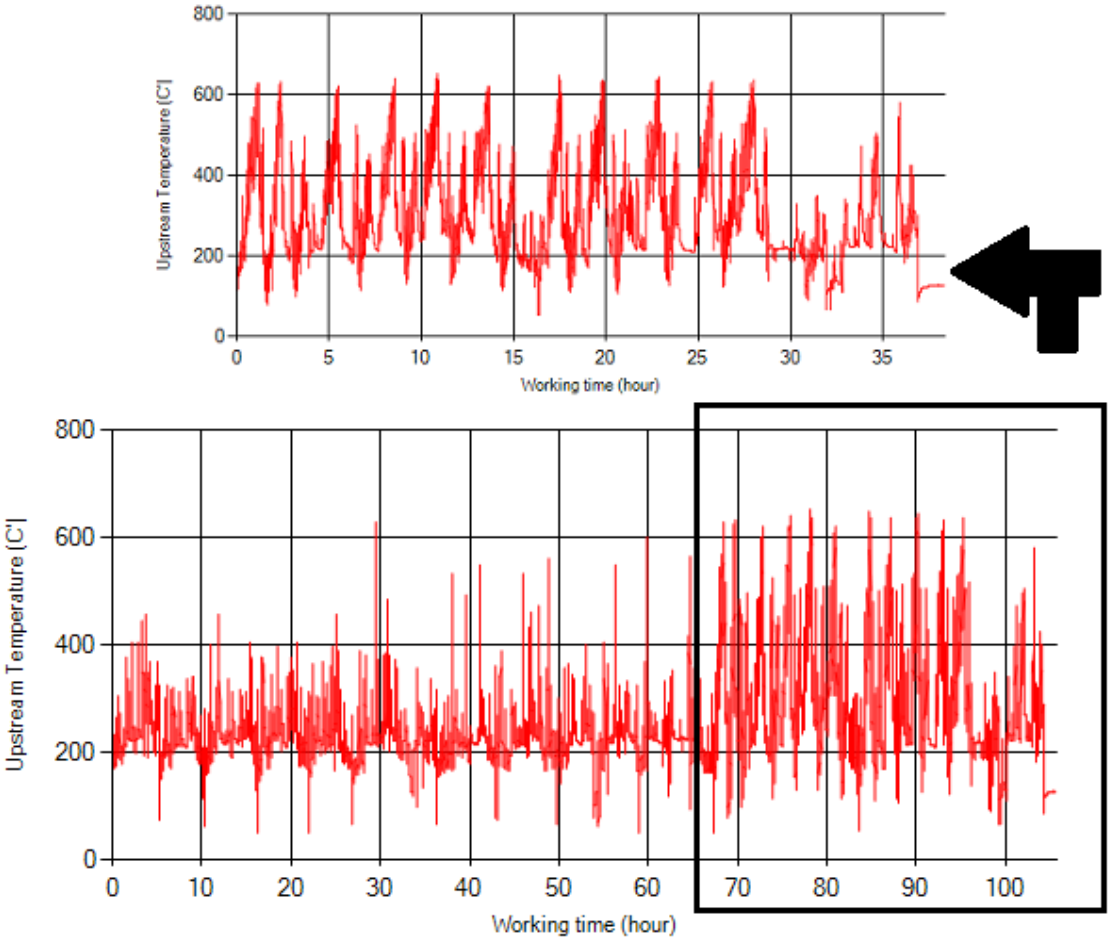


Figure 8- Temperature vs. working hours

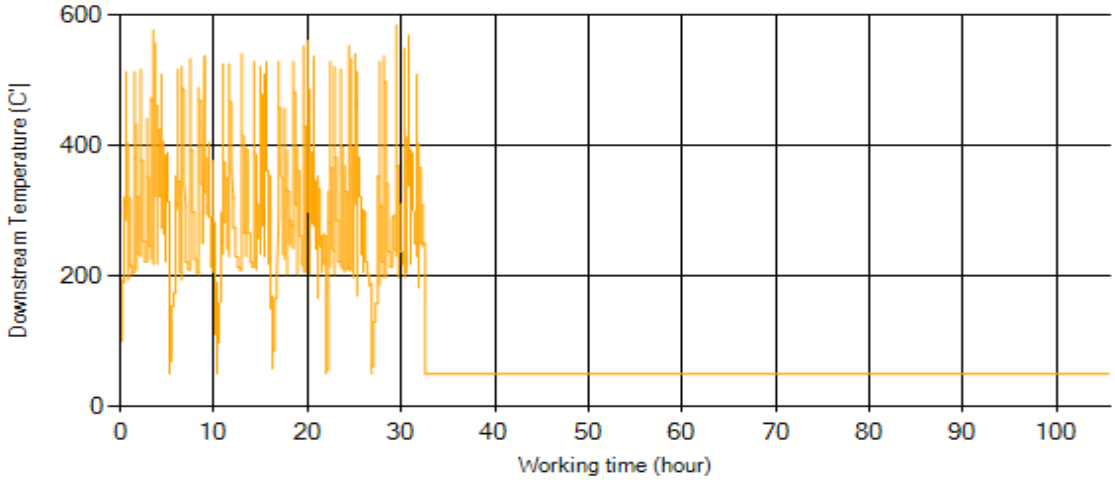


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

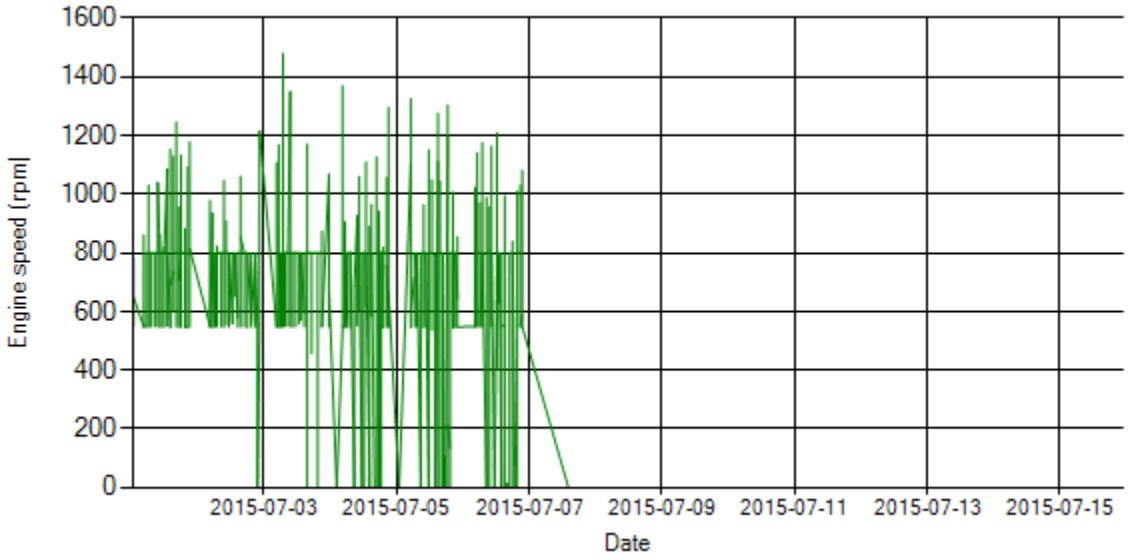


Figure 10- Engine speed distribution over the period

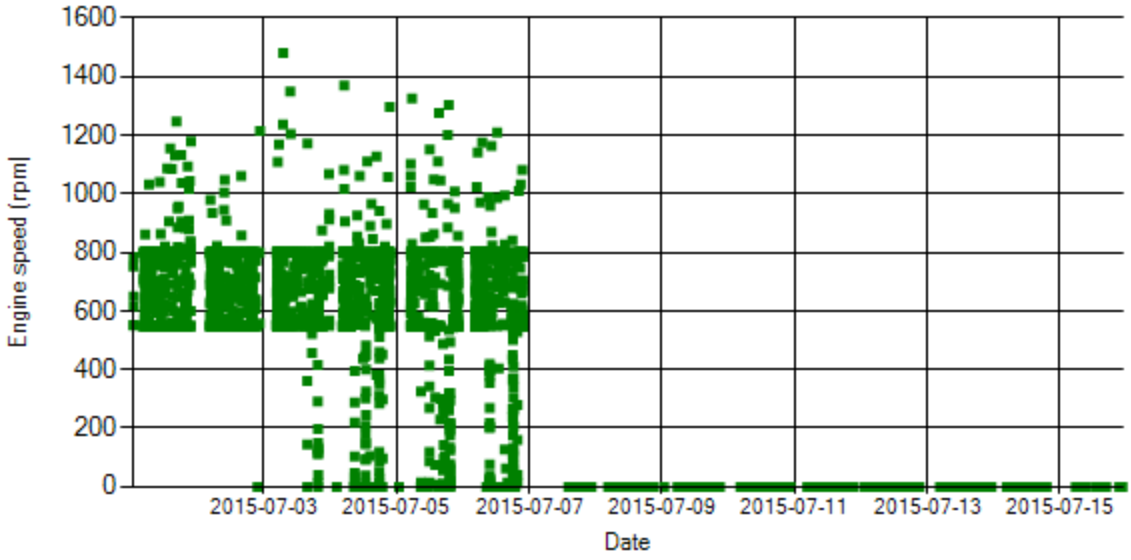


Figure 11- Engine speed diagram for calculating CPK's working day

Notice: As mentioned above, RPM sensor data have been missed because of sensor problem since Jul 7th. Besides that, considering data logger electrical problem figures 10 and 11 are fully unreliable.

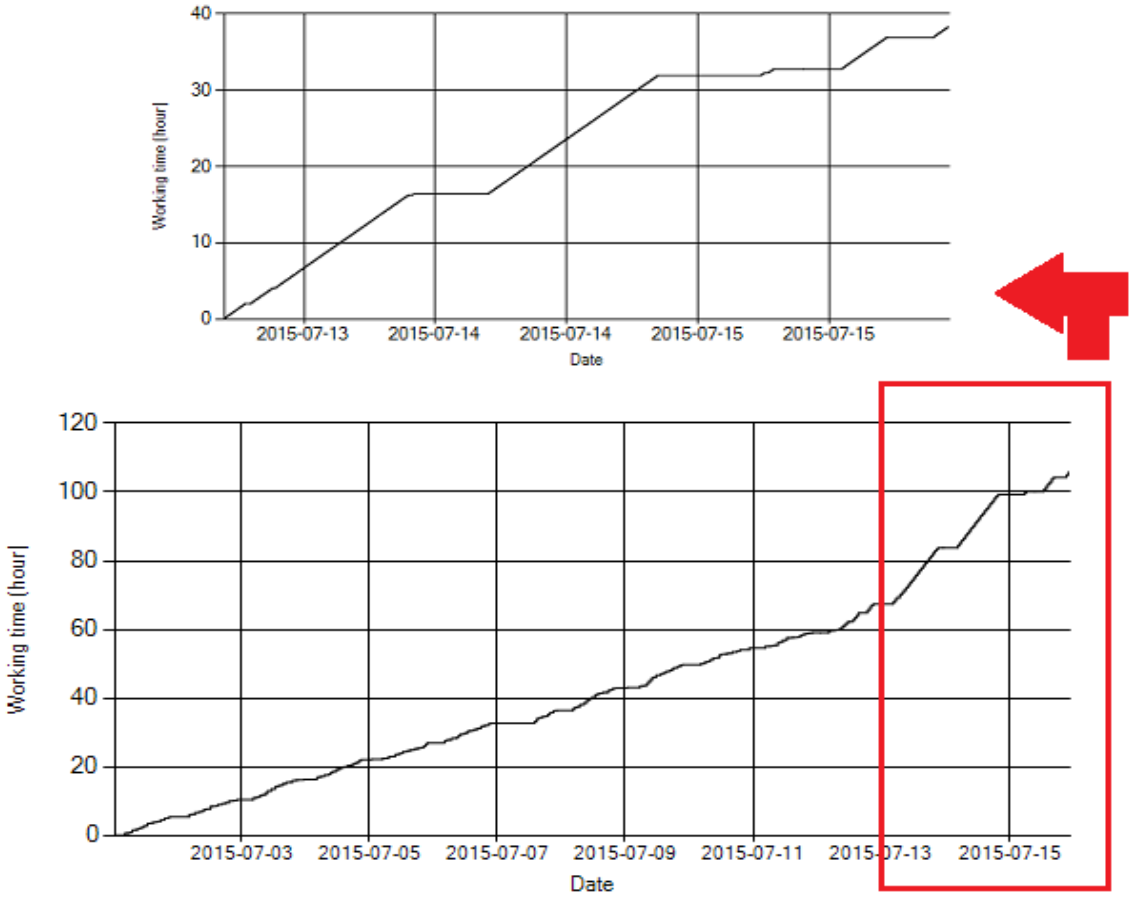


Figure 12- Time diagram for calculating CPK's working days

Pressure-Engine Speed diagrams

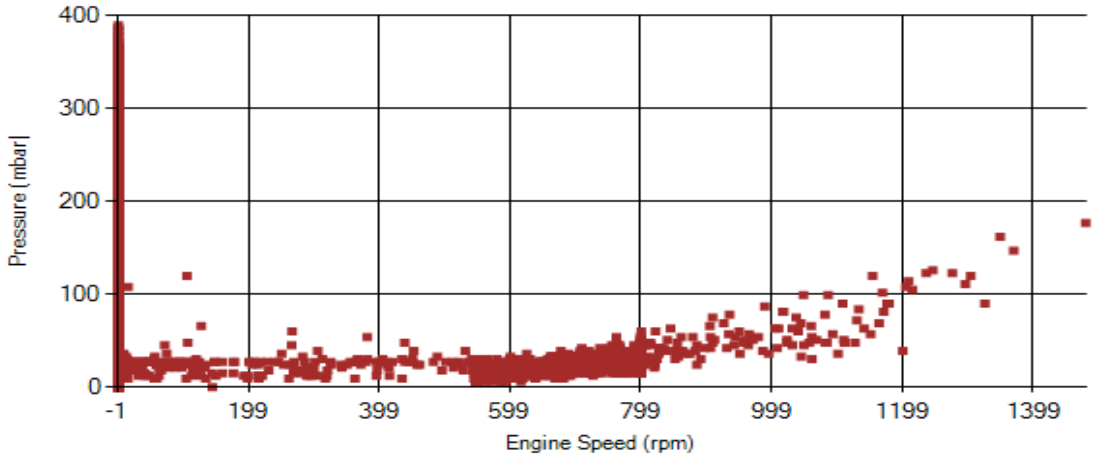


Figure 13- Pressure against engine speed

Notice: Because of technical problems this chart data are unreliable.

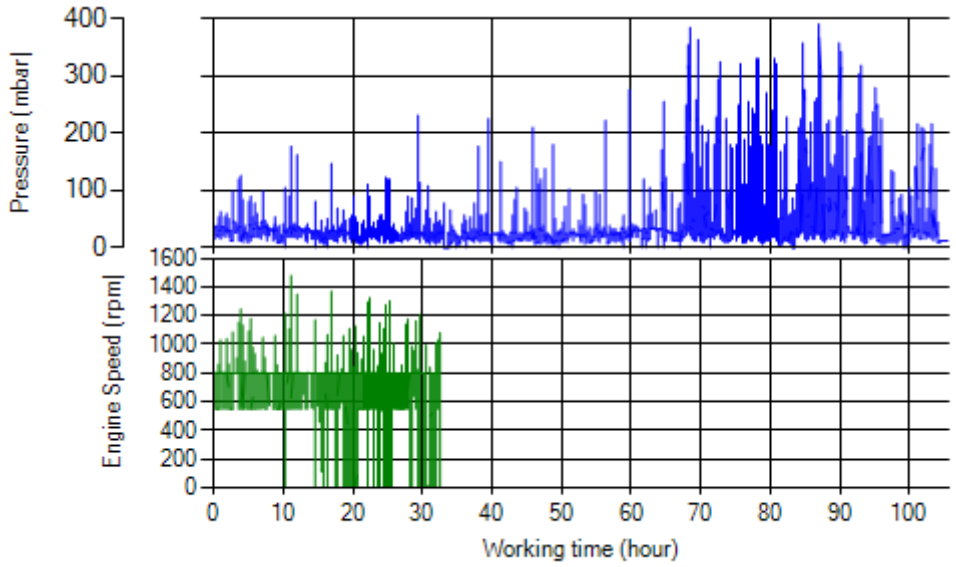


Figure 14- P, N distribution vs. working hours

Notice: Because of technical problems this chart data are unreliable.

Temperature-Engine Speed diagrams

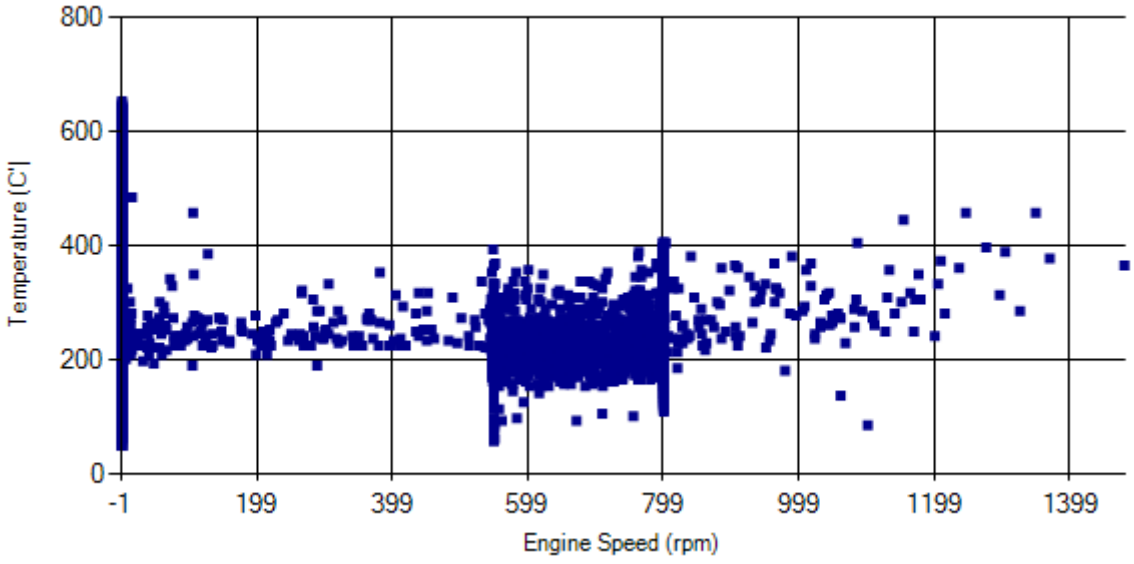


Figure 13- Temperature against engine speed

Notice: Because of technical problems this chart data are unreliable.

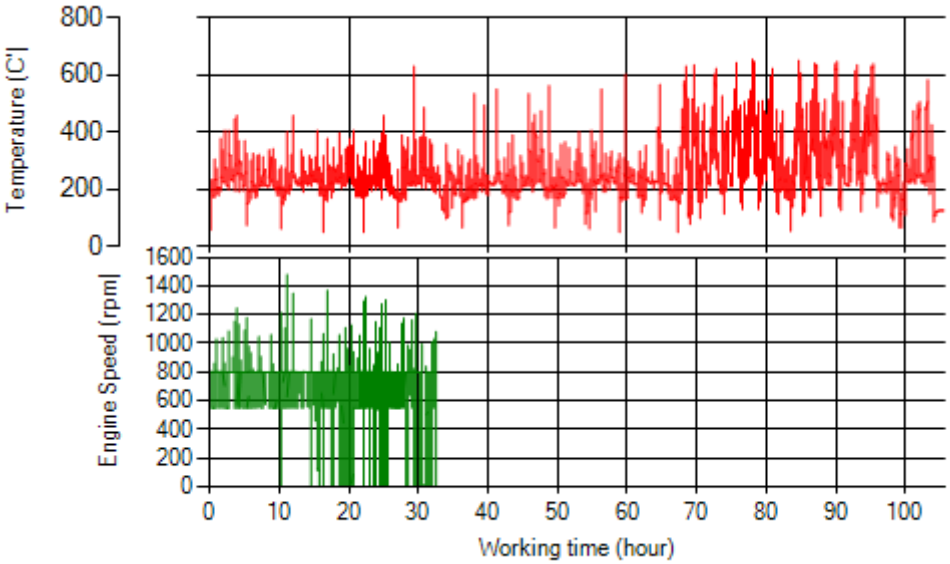


Figure 14- T, N distribution vs. working hours

Notice: Because of technical problems this chart data are unreliable.

Filter Operation Analysis

Considering data logger working days:

- As depicted in figure 1, 5.71 % of total working time, pressure is above 200 mbar and 9.19% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 19% of total working time temperature is above 400 ℃ and 28% above 350℃. Considering Figure 1, it can be obtained that, high temperature distribution in figure 2 was the result of high backpressure. So this high temperature distribution was deceptive and can't guarantee adequate filter operation.

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

ASA Azmoon Sanat Arvin	Document Number: DPF2015072/1 Date: 15/Aug/2015

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/Jul/2015 – 31/Jul/2015 (sixteen days)
K value – Muffler upstream	1.83 [1/m]
K value – Muffler downstream	1.83 [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.

Notice: This high suspension was because of DPF cleaning machine late arrival. Bus was sent to line on Jul 23rd by replaced muffler, so during this period our system had not DPF system.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	26029 km
Bus mileage over the period	2011 km
Working days over the period	8 days
Stop days	8 days
Data logger working days	8 days
Working hours over the period	140 hours 20 minutes
Average working hours per day (including stop days)	8 hours 46 minutes
Bus average speed	14.33 km/hr
Idle speed time to all working time ration	51 %*
Total Bus fuel consumption over the period	1165 lit
Fuel consumption per hour	8.30 lit/hr
Average fuel consumption	0.58 lit/km
Total Bus additive consumption over the period	-
Average additive consumption	-
Additive consumption to fuel ration	-

*Temperature data were used for calculating idle working ration.

Temperature, Pressure and Engine Speed Overview

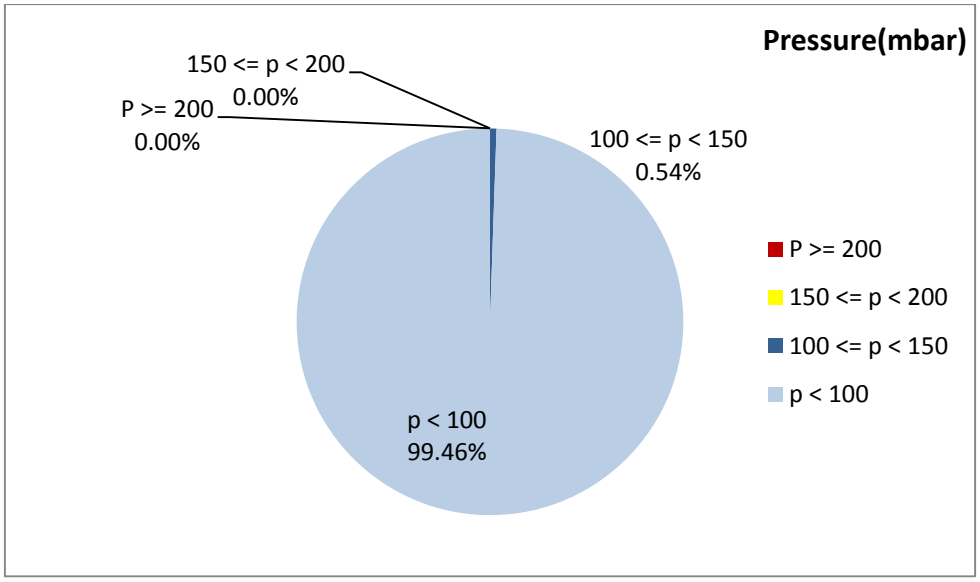


Figure 1- Pressure distribution over the working hours

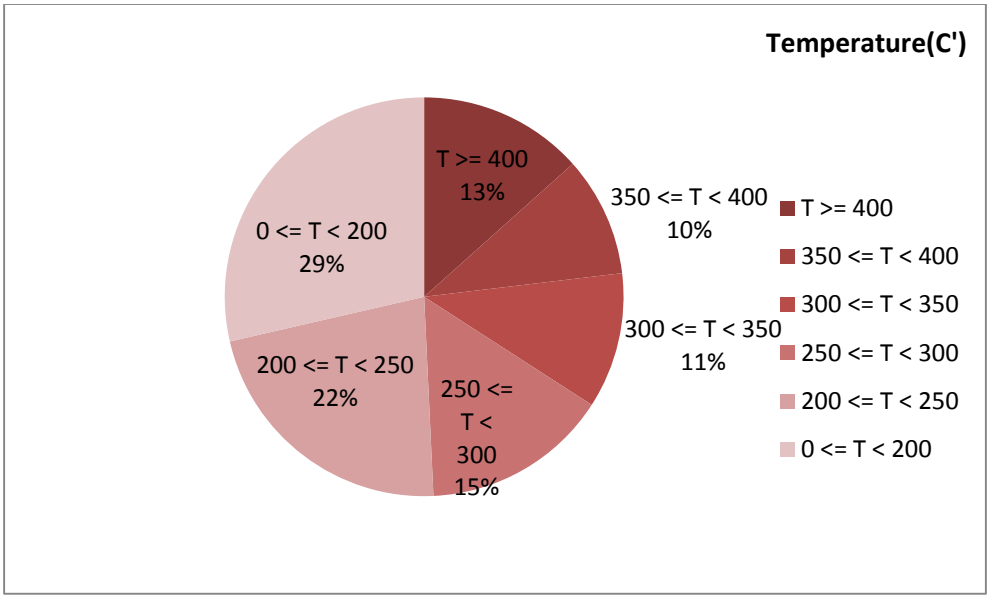


Figure 2-Temperature distribution over the working hours

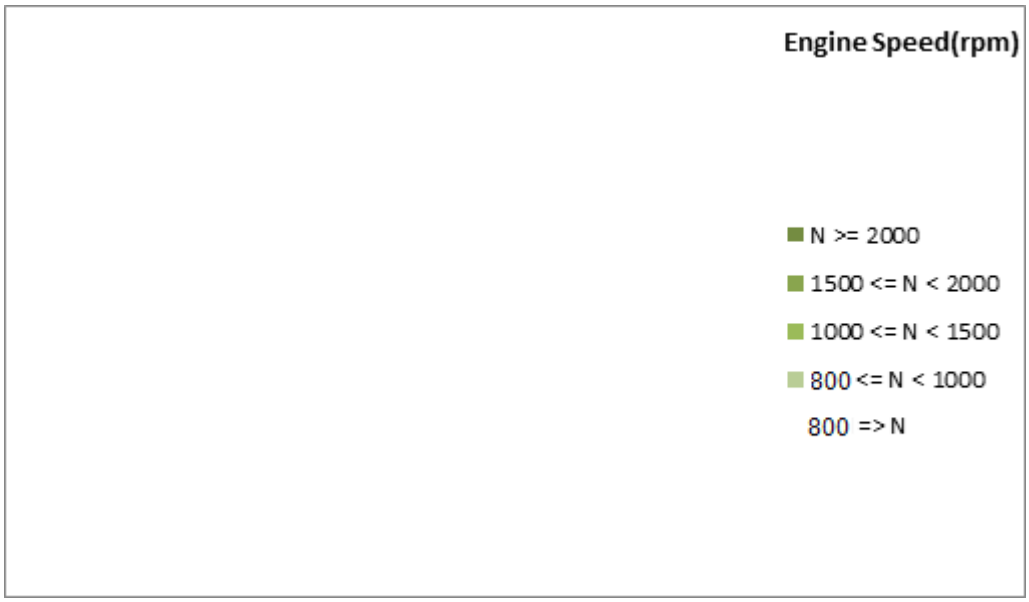


Figure 3- Engine speed distribution over the working hours

Notice: All engine speed data missed due to rpm sensor problem.

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
265.35	7.34	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
340.02	13.90	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
562-50	117-0	-

Detailed Pressure Analysis

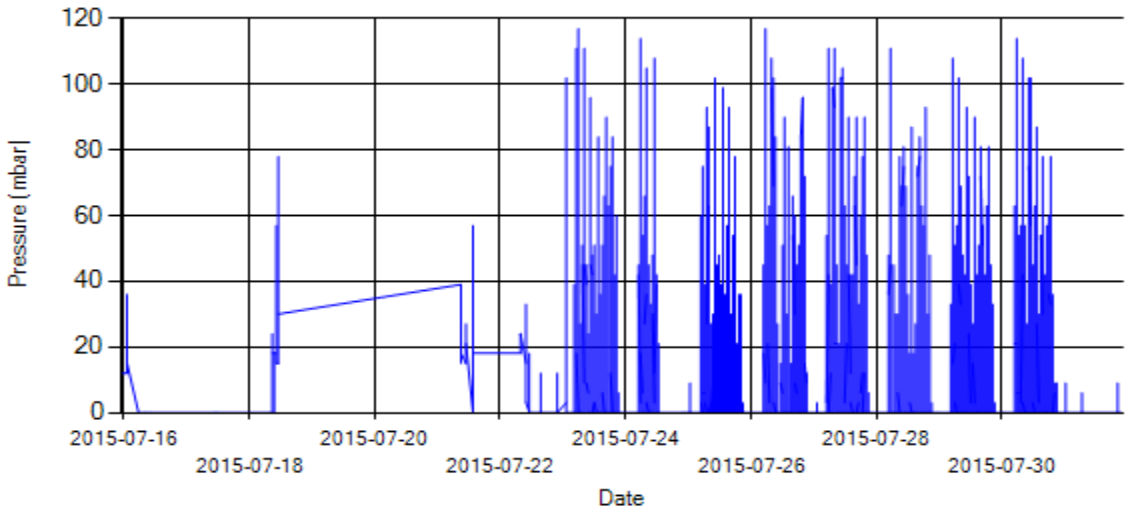


Figure 4- Pressure distribution over the period

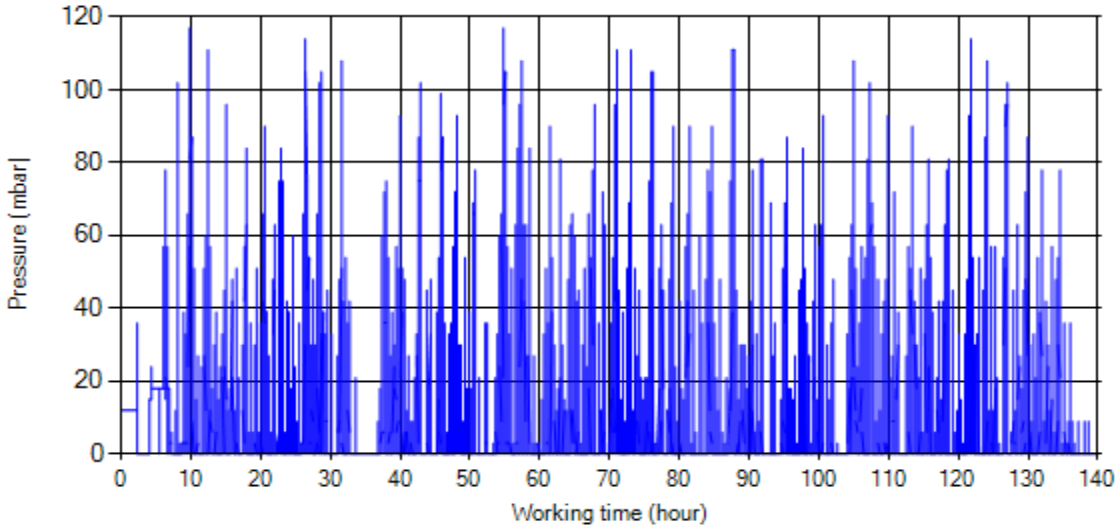


Figure 5- Pressure vs. working hours

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.

Notice: This pressure existence was due to muffler and DOC.

Detailed Temperature Analysis

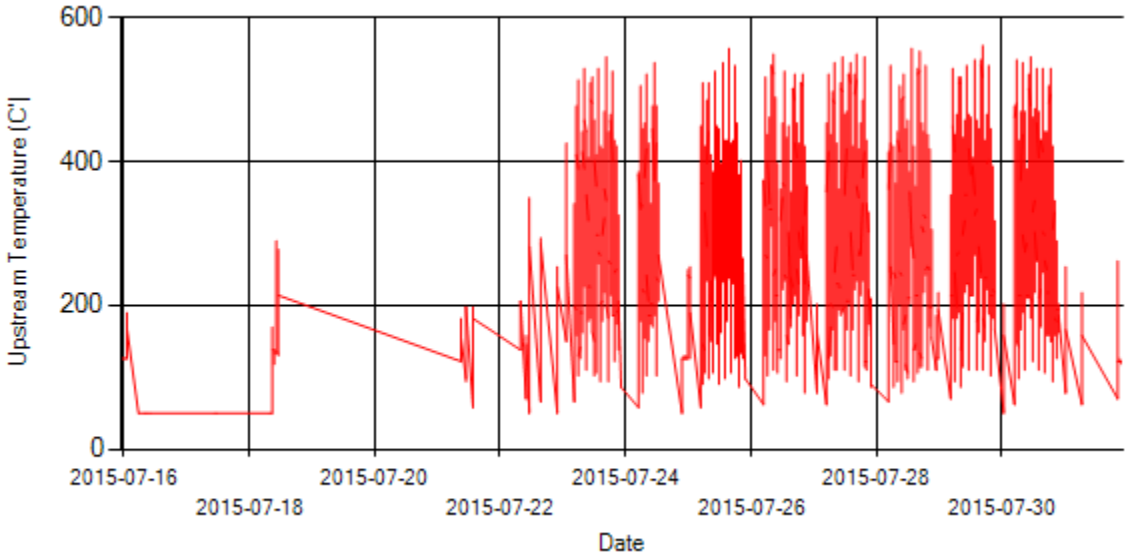


Figure 6- Temperature distribution over the period

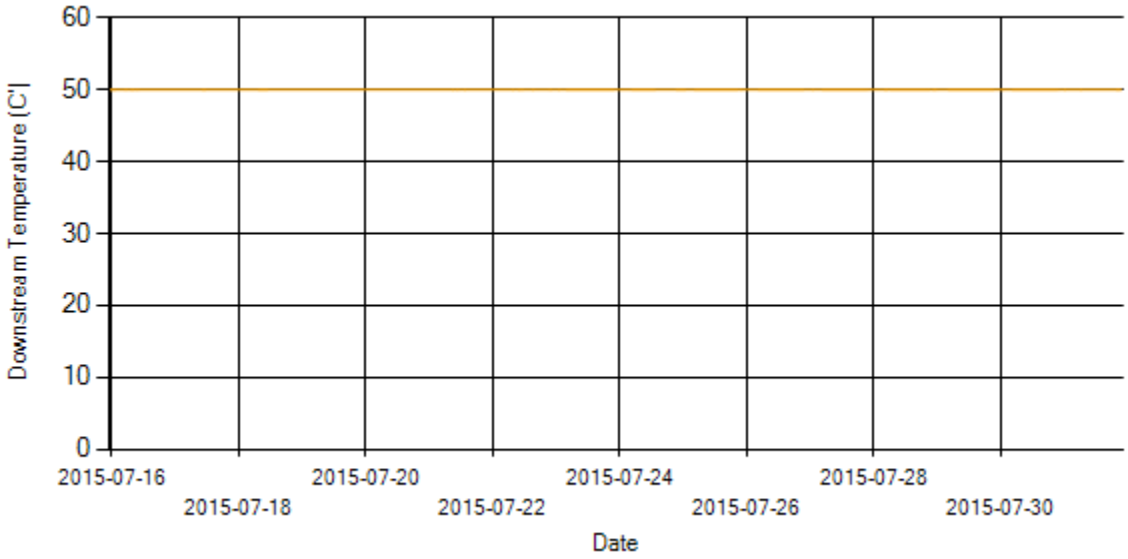


Figure 7- Temperature distribution over the period

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

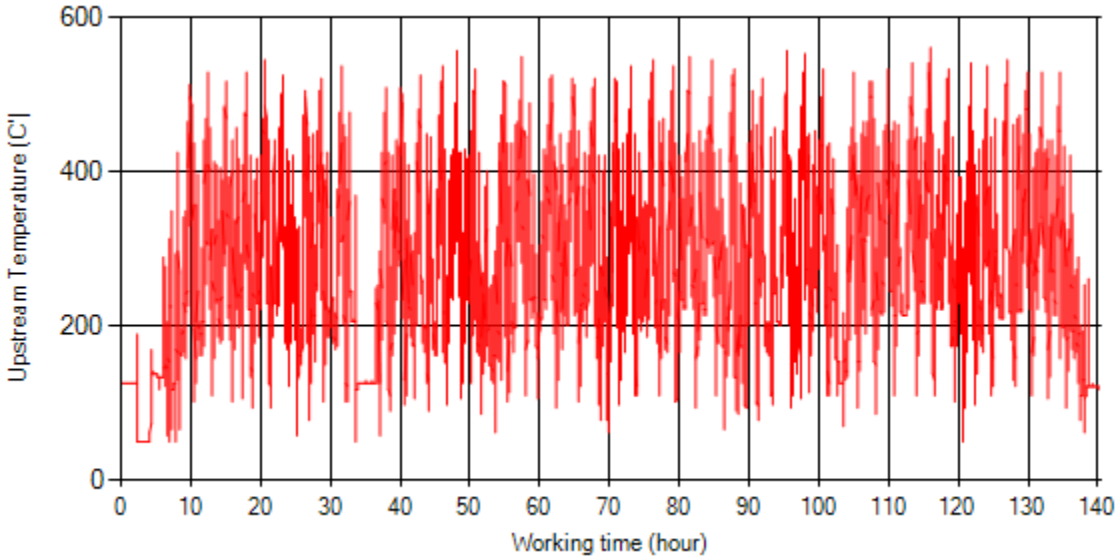


Figure 8- Temperature vs. working hours

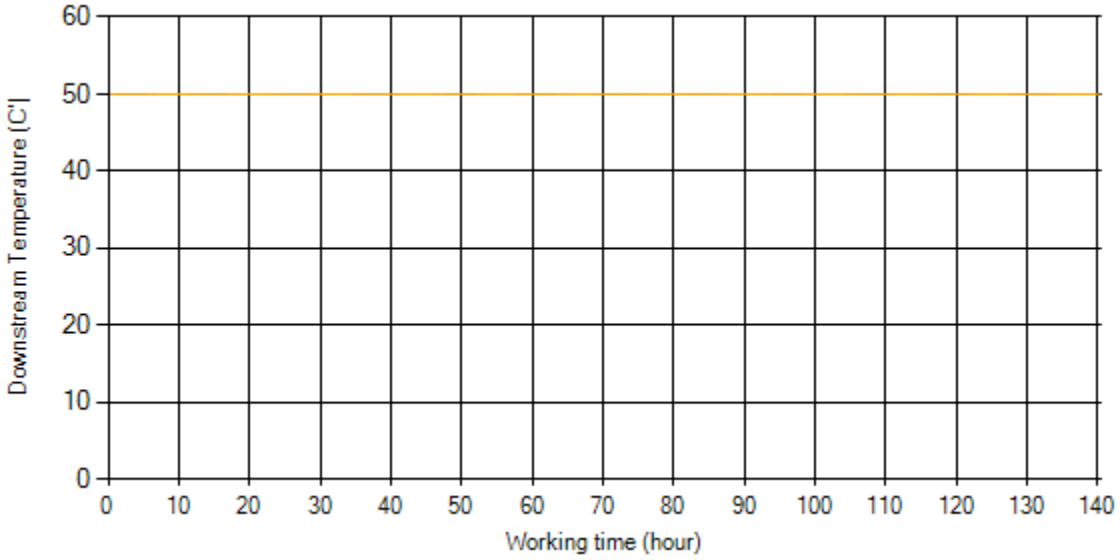


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

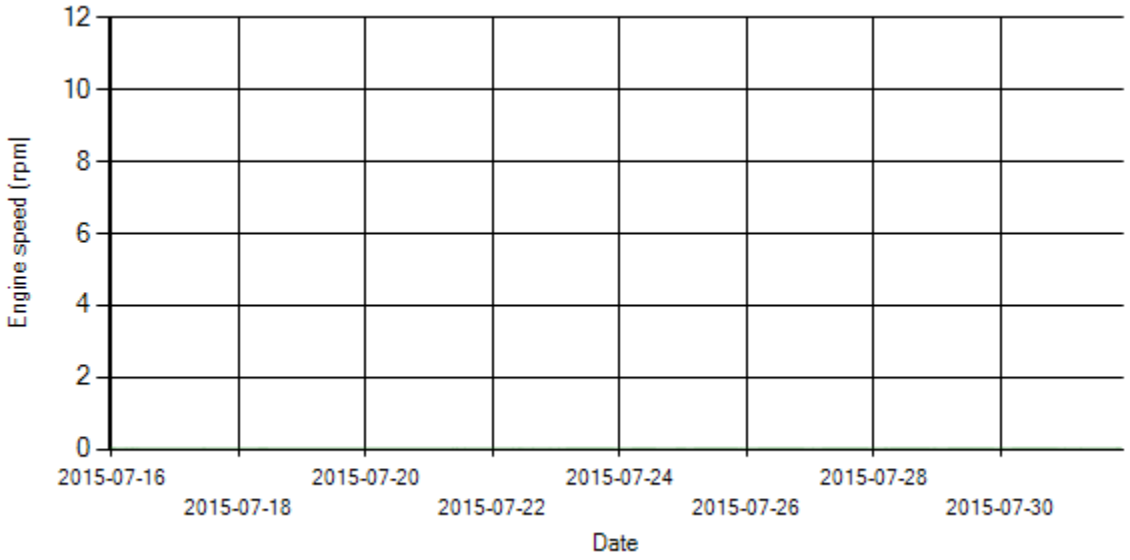


Figure 10- Engine speed distribution over the period

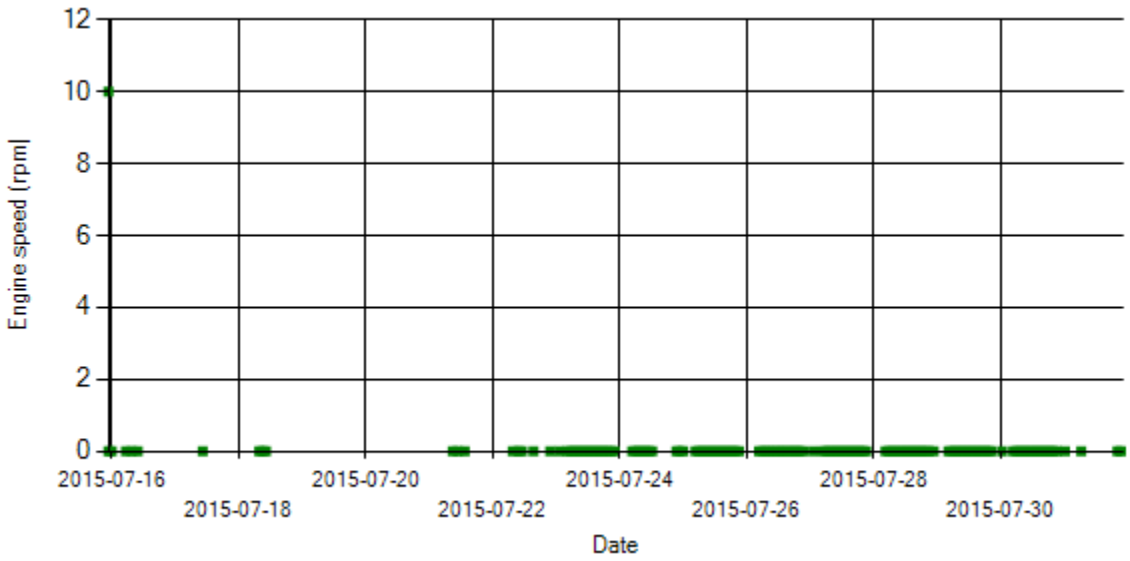


Figure 11- Engine speed diagram for calculating CPK's working days

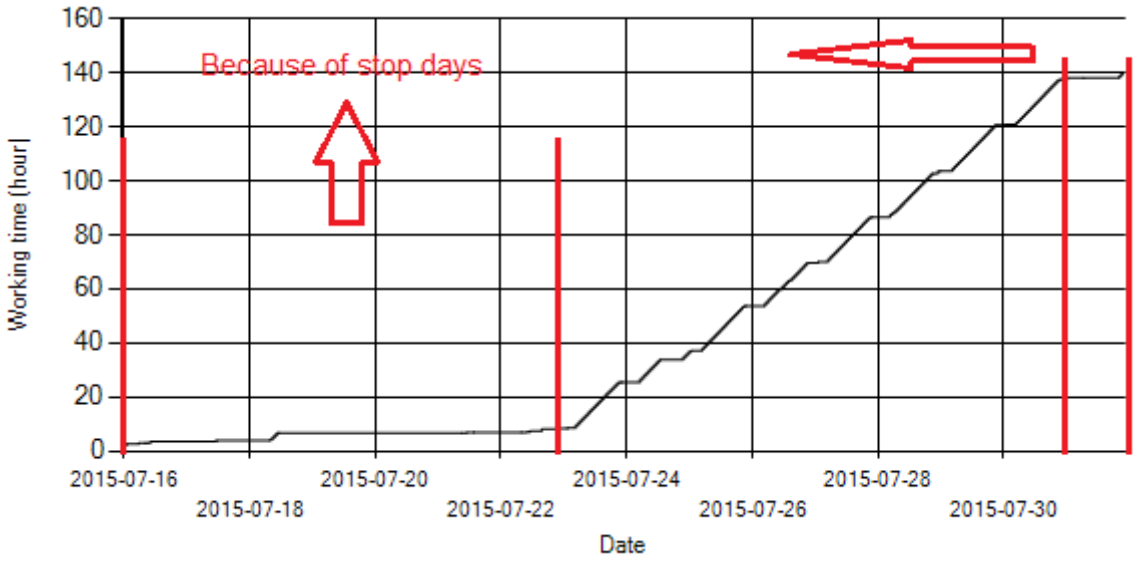


Figure 12- Time diagram for calculating CPK's working days

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, data logger didn't sample 8 days because of stop days.

Pressure-Engine Speed diagrams

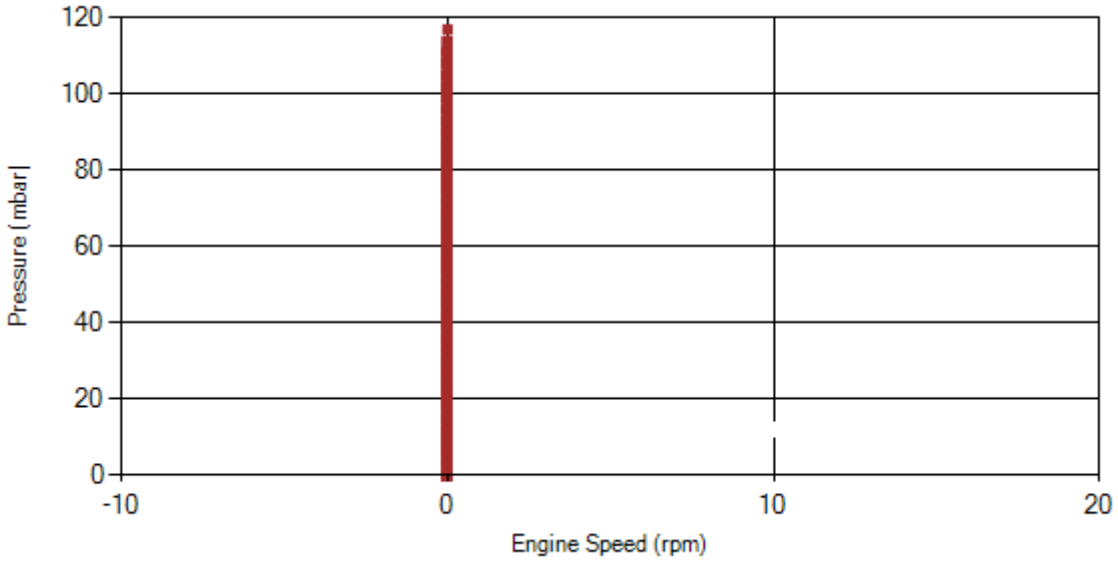


Figure 13- Pressure against engine speed

Notice: RPM sensor had problem during this period and showed zero values.

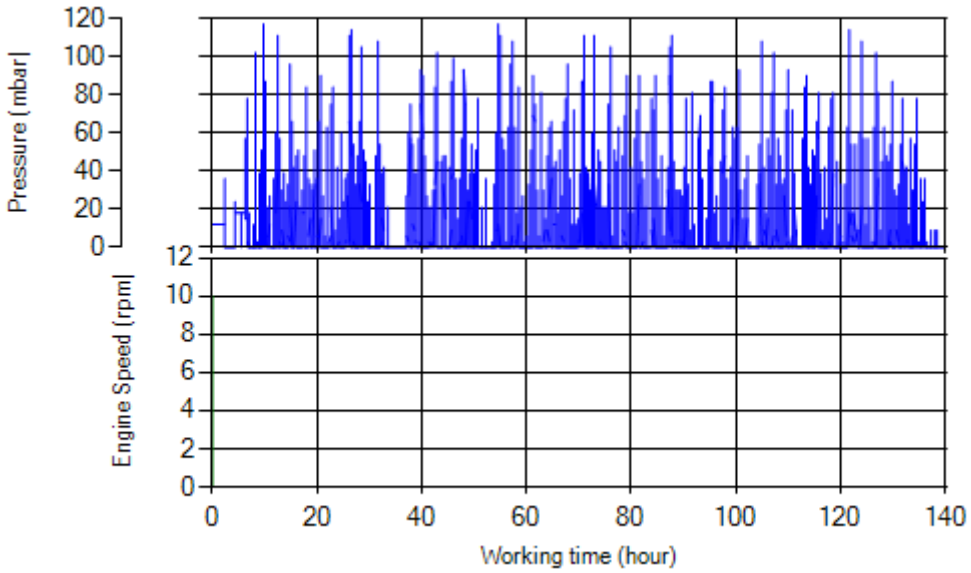


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

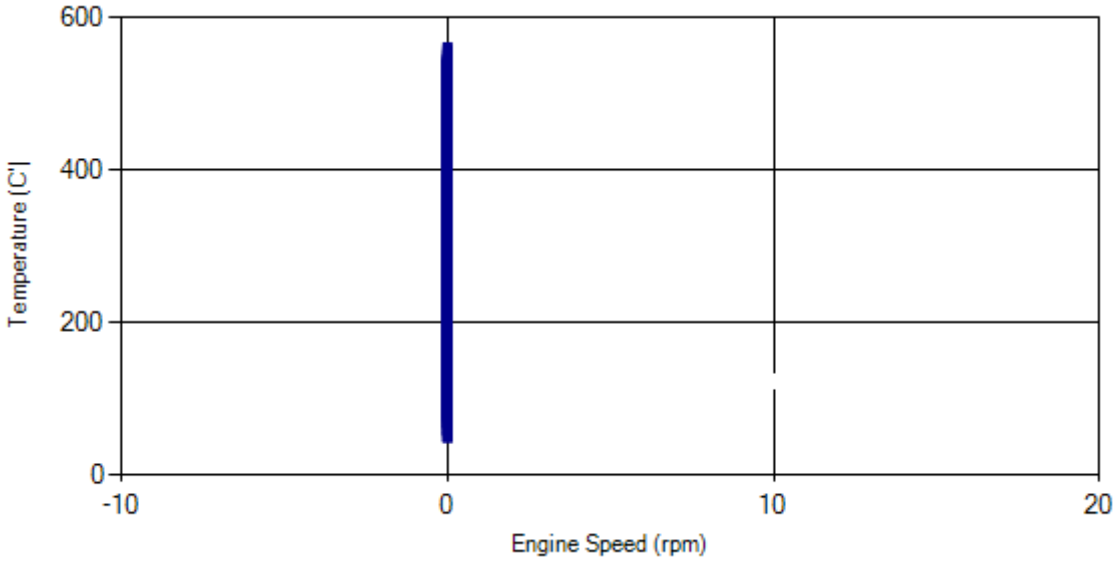


Figure 13- Temperature against engine speed

Notice: RPM sensor had problem during this period and showed zero values.

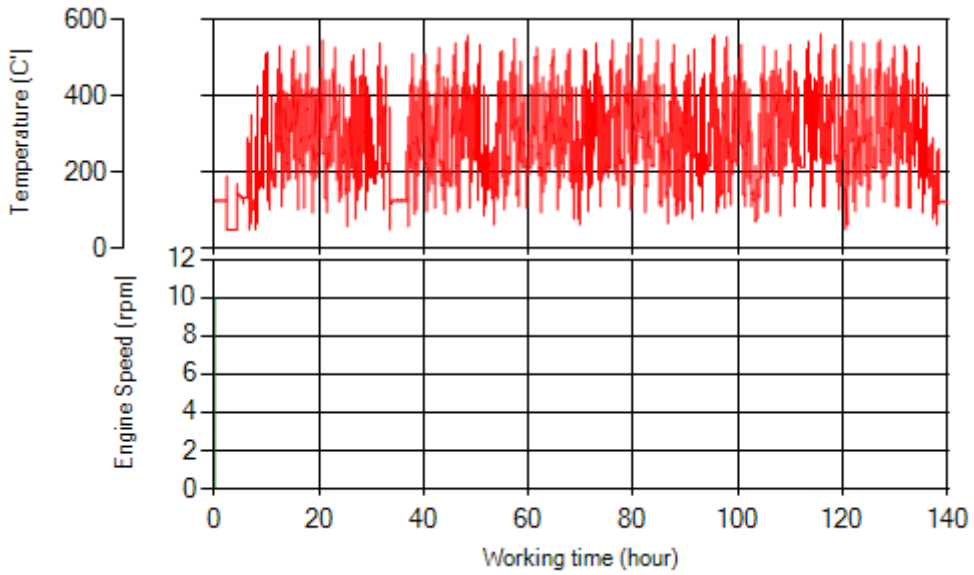


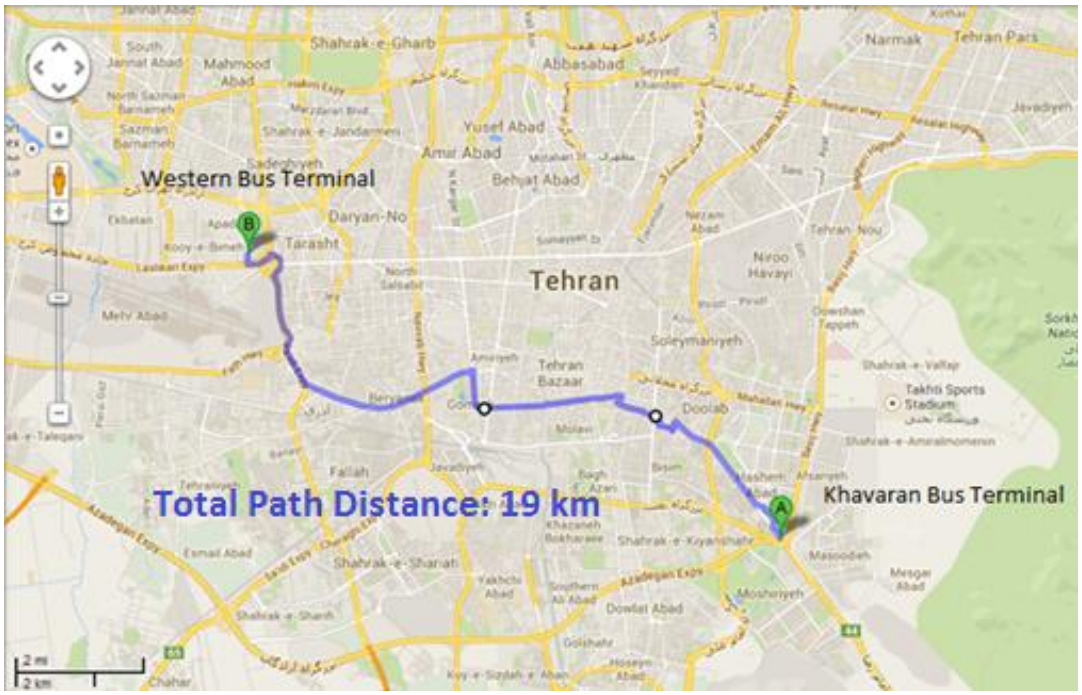
Figure 14- T, N distribution vs. working hours

Filter Operation Analysis

This system didn't have DPF during this period.

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

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)



AZMOON SANAT ARVIN	Document Number: DPF2015071/1 Date: 08/Aug/2015

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/Jul/2015 – 15/Jul/2015 (fifteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.06 [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)	21063 km
Bus mileage over the period	2351 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	188 hours 37 minutes
Average working hours per day (including stop days)	12 hours 34 minutes
Bus average speed	12.47 km/hr
Idle speed time to all working time ration	56%*
Total Bus fuel consumption over the period	1413 lit
Fuel consumption per hour	7.5 lit/hr
Average fuel consumption	0.60 lit/km
Total Bus additive consumption over the period	0.580 lit
Average additive consumption	246 cc/km
Additive consumption to fuel ration	410 cc per 1000 lit (batch dosing with tank level)

*Notice: Due to rpm sensor problem during this period, temperature data were used for idle working time measurement.

Temperature, Pressure and Engine Speed Overview

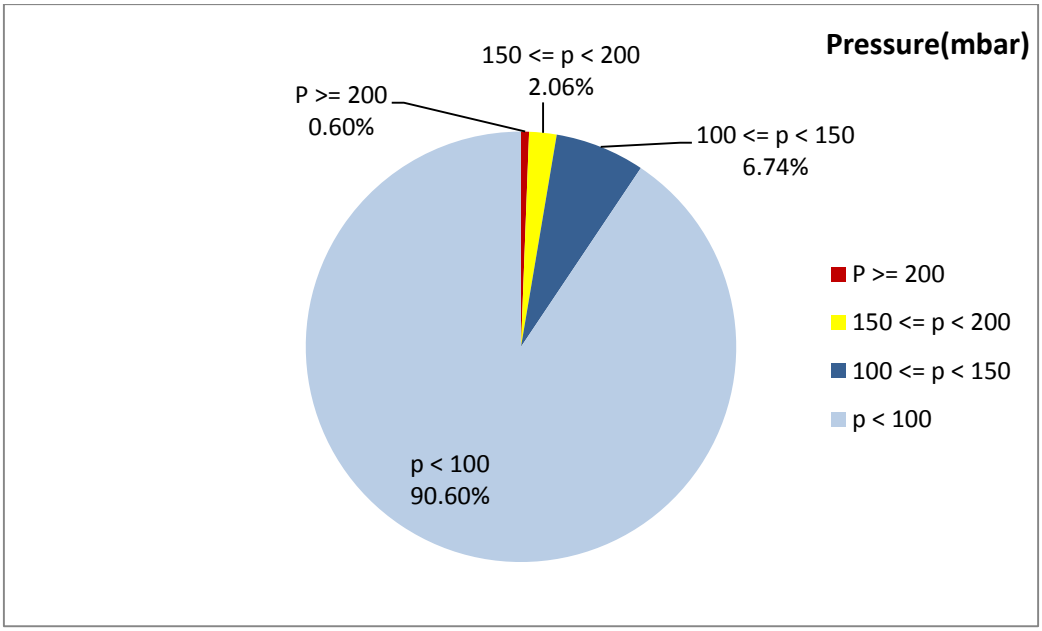


Figure 1- Pressure distribution over the working hours

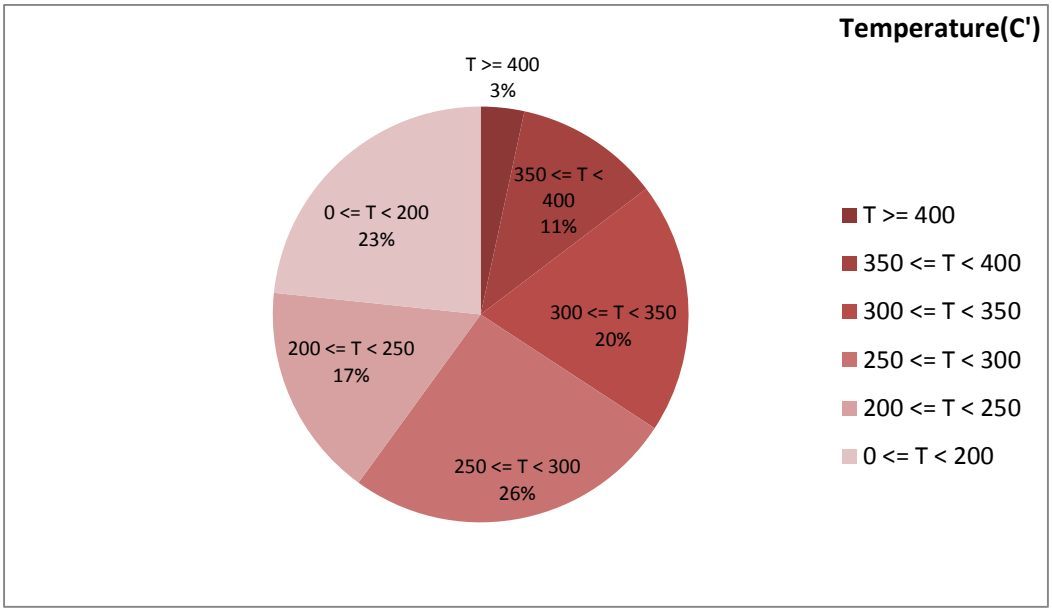


Figure 2-Temperature distribution over the working hours

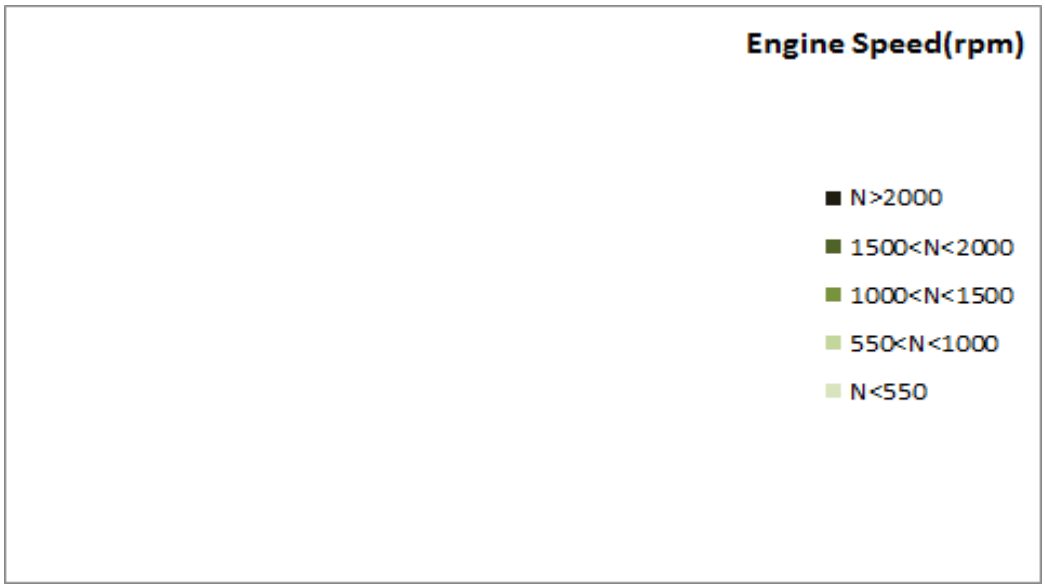


Figure 3- Engine speed distribution over the working hours

Notice: RPM sensor got problem on Jul 7th and showed zero number. This problem was fixed on 13th. Due to loss of some data, figure 3 is blank.

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
264.32	38.26	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
307.90	50.39	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
550-50	387-0	-

Notice: Due to RPM sensor problem, engine speed parts are blank.

Detailed Pressure Analysis

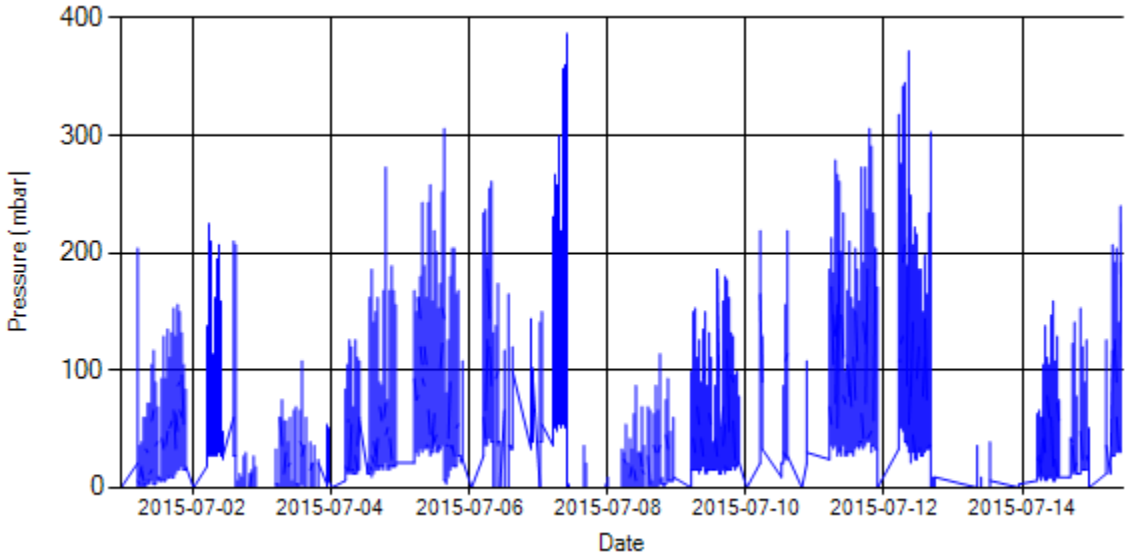


Figure 4- Pressure distribution over the period

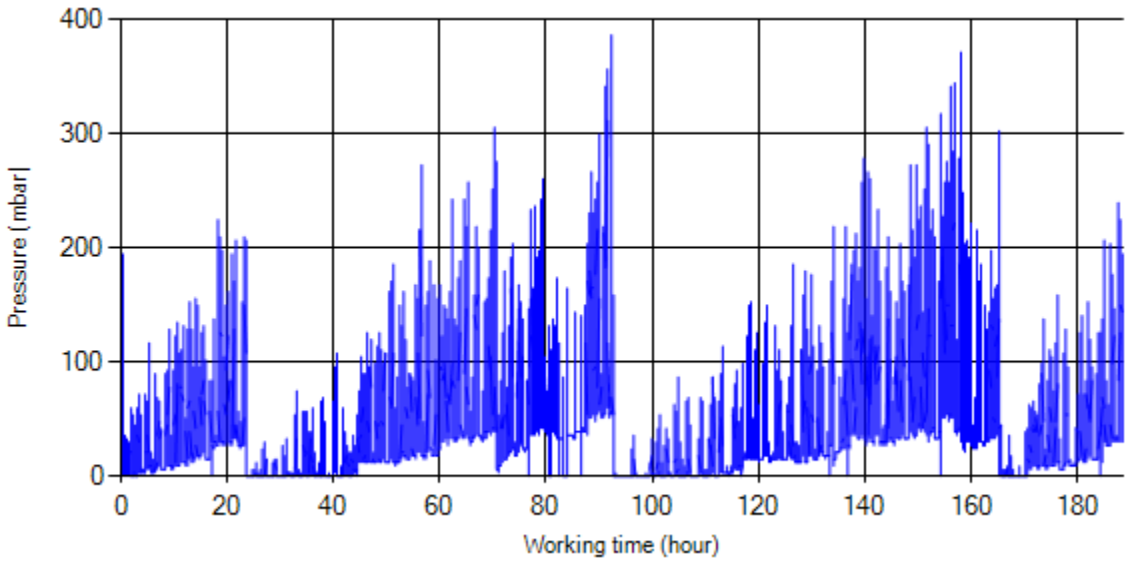


Figure 5- Pressure vs. working hours

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

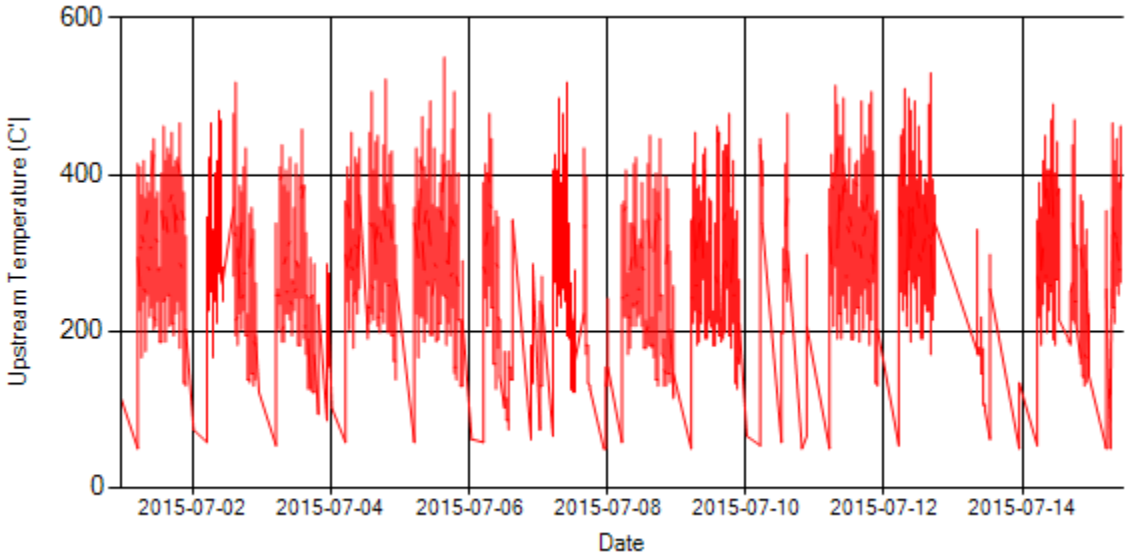


Figure 6- Temperature distribution over the period

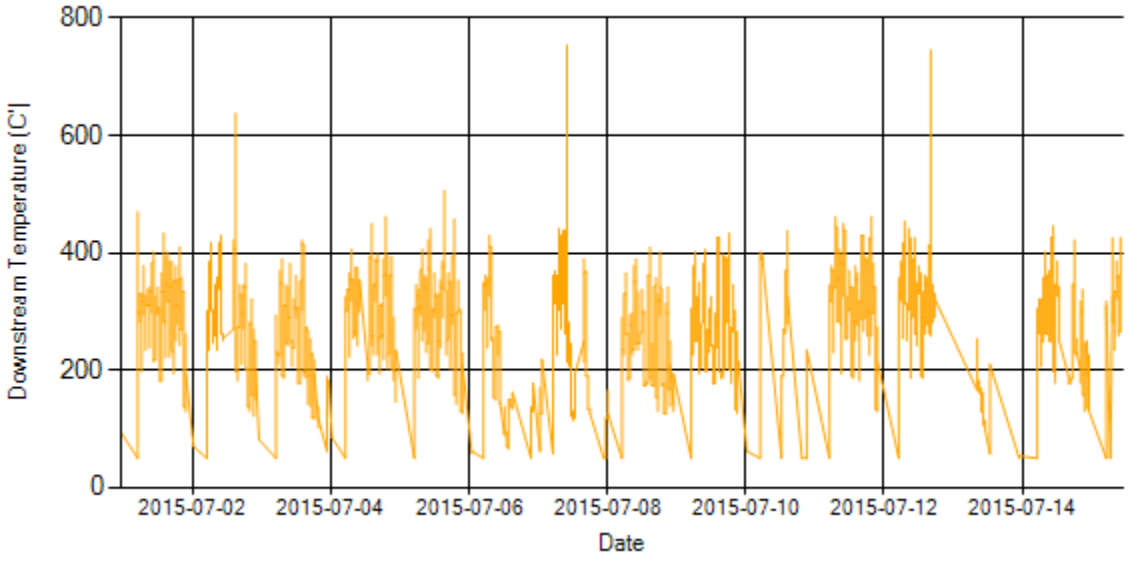


Figure 7- Temperature distribution over the period

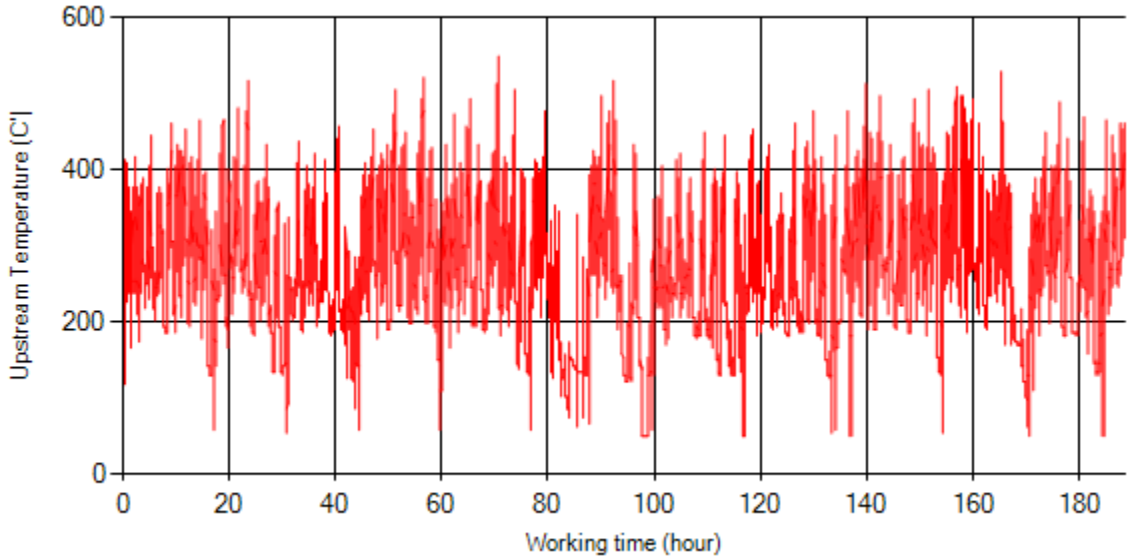


Figure 8- Temperature vs. working hours

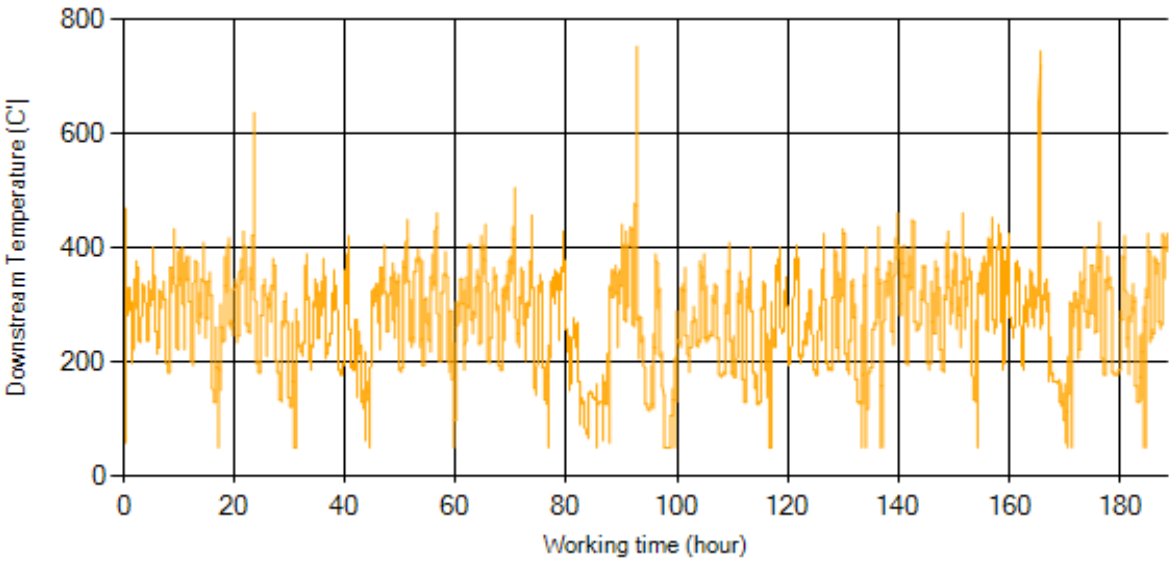


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

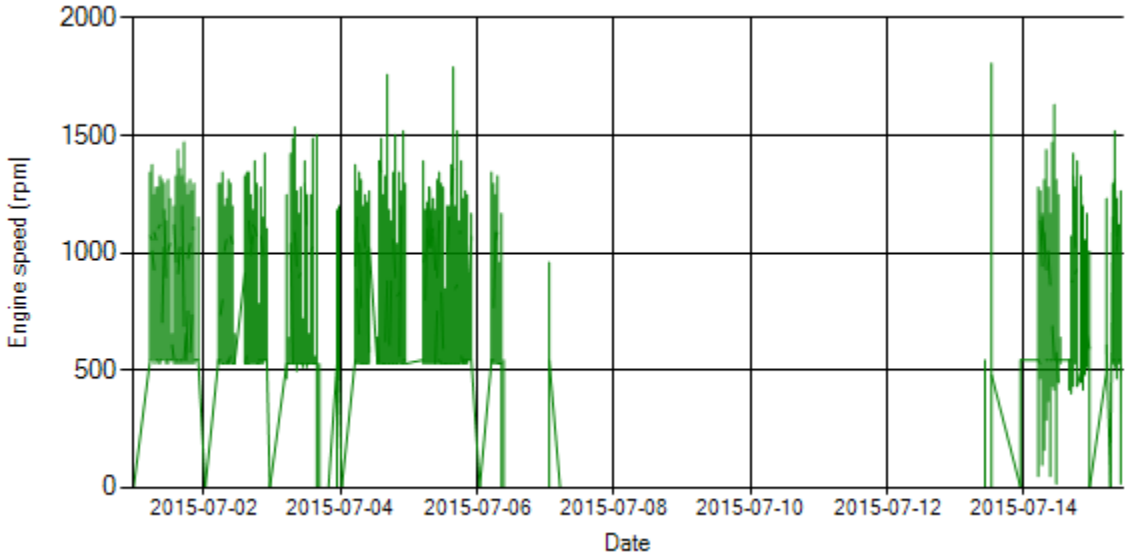


Figure 10- Engine speed distribution over the period

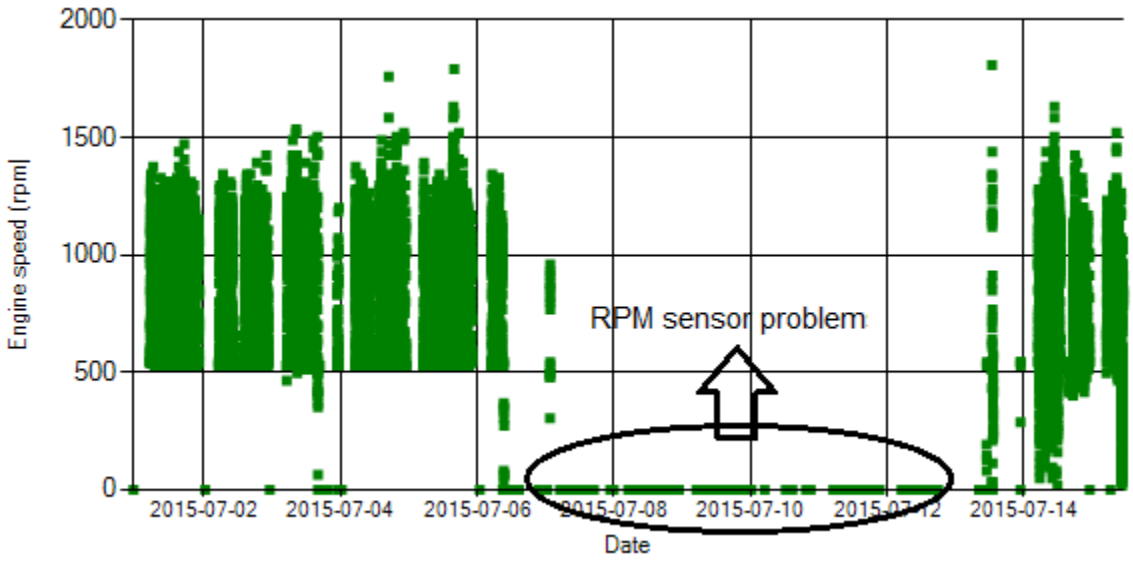


Figure 11- Engine speed diagram for calculating CPK's working days

Notice: RPM sensor had problem and showed zero values from Jul 7th until Jul 13th.

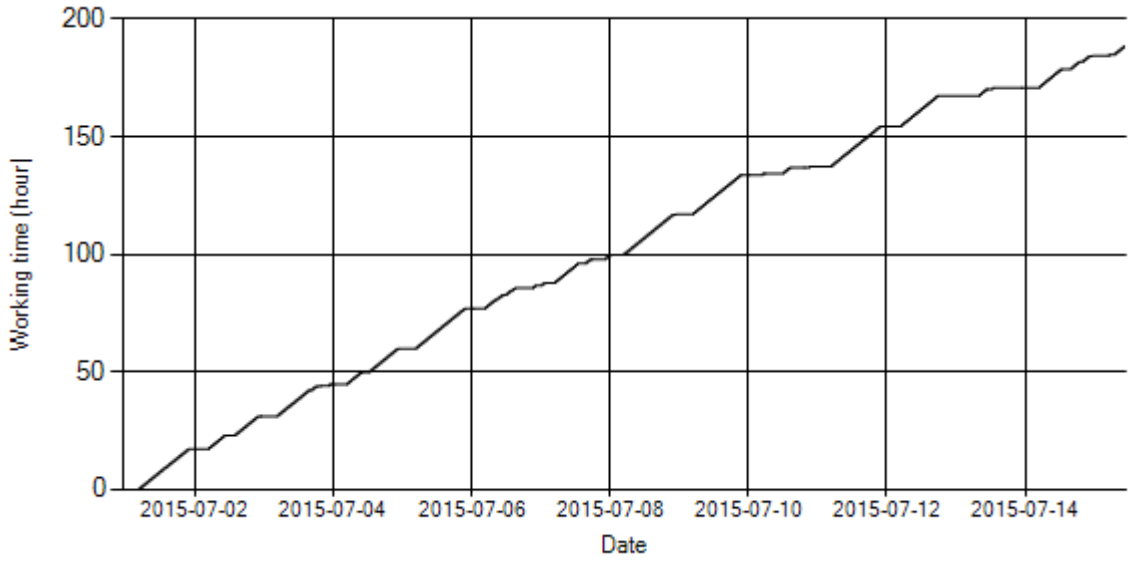


Figure 12- Time diagram for calculating CPK's working days

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, bus was working all days during this period.

Pressure-Engine Speed diagrams

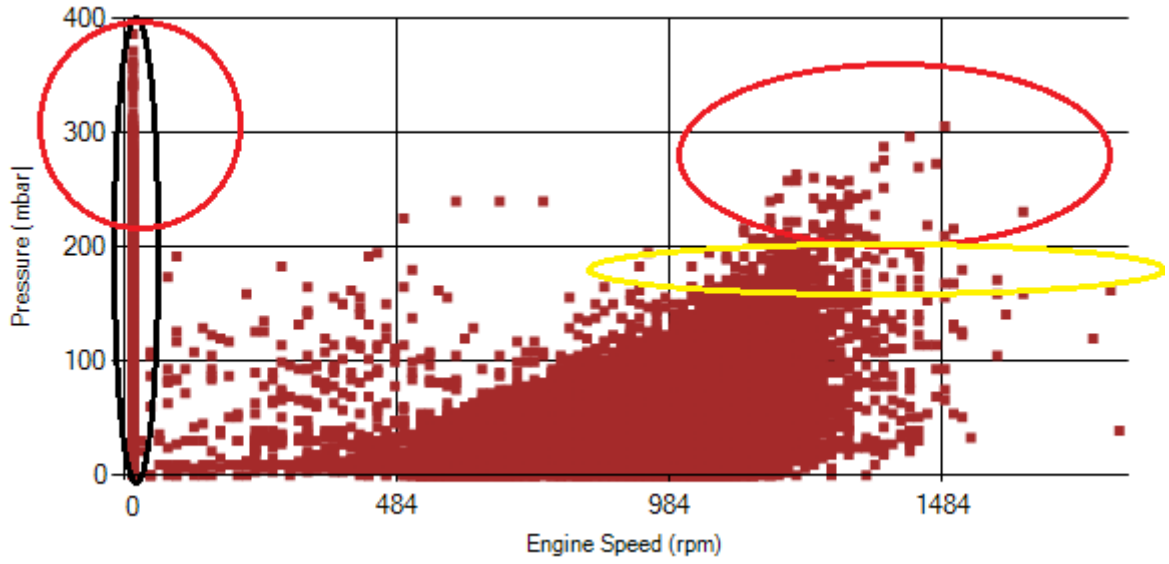


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200 mbar) and yellow alarm (200>pressure>150) ranges were indicated in figure 13. The line parallels with pressure axis is due to rpm sensor problem (black region).

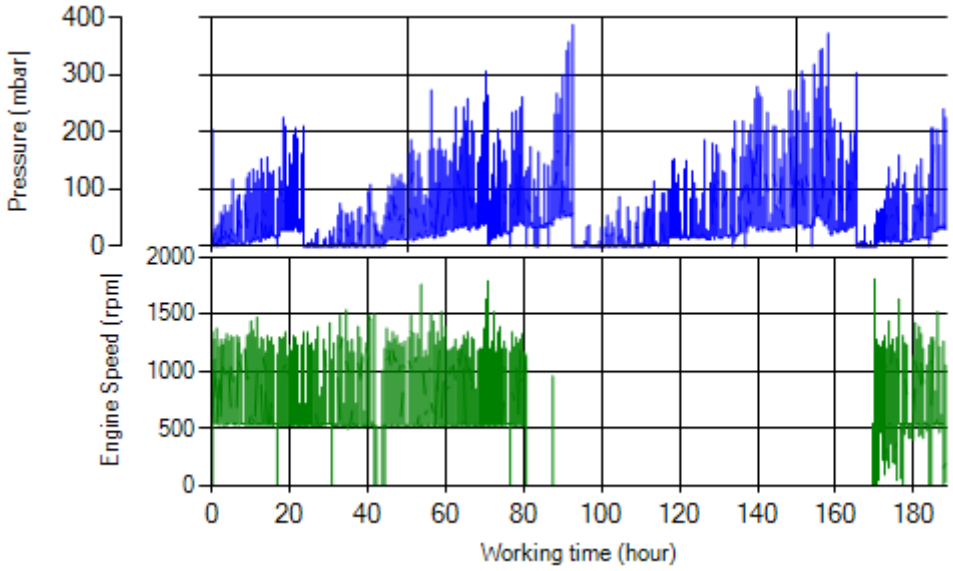


Figure 14- P, N distribution vs. working hours

Notice: RPM sensor had problem and showed zero value from Jul 7th until Jul 13th.

Temperature-Engine Speed diagrams

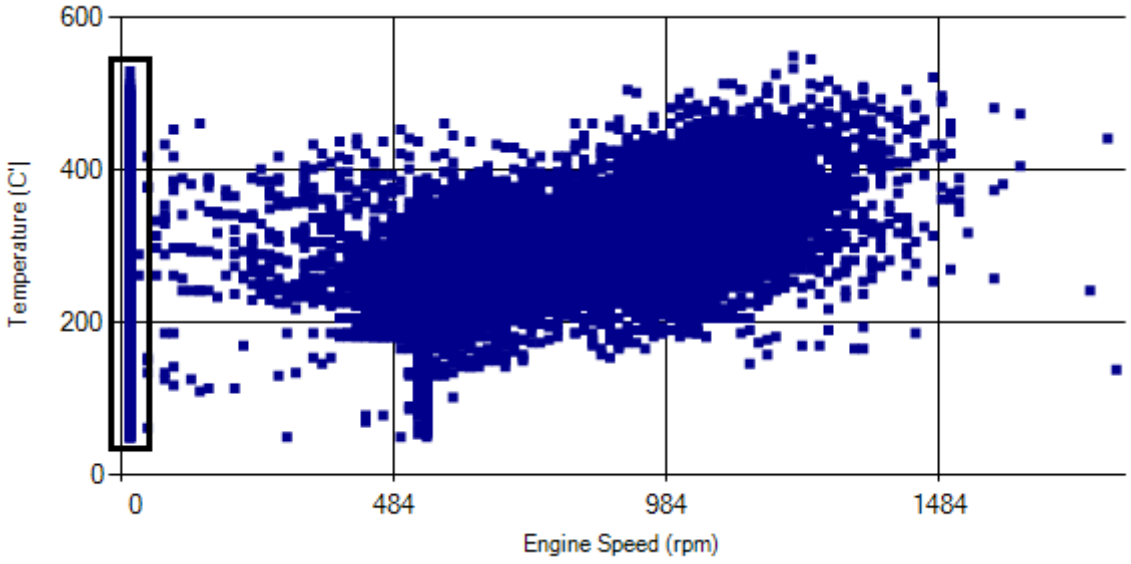


Figure 14- Temperature against engine speed

Notice: The line parallel with temperature axis is due to rpm sensor problem (black region).

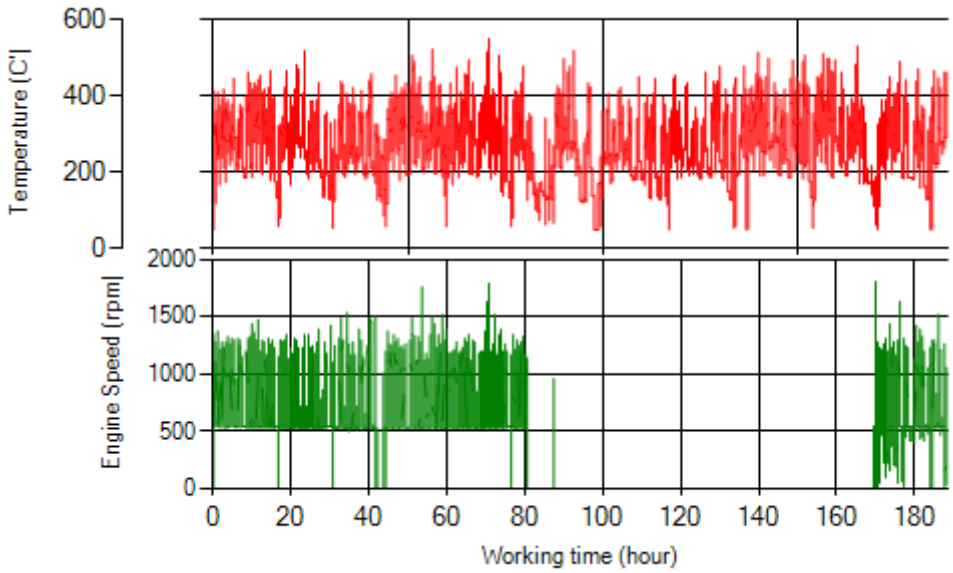


Figure 15- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.60% of total working time pressure is above 200 mbar and 2.66% 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 line 2 usual temperature distribution (temperature above 400℃ < 1 %), it is obvious this rise in temperature was related to pressure increase due to DPF's ash loading.
- This vehicle operates in line 2. Because of smooth path of this line, engine operates in low rotational speed.

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

AZMOON SANAT ARVIN	Document Number: DPF2015072/1 Date: 15/Aug/2015

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	016/Jul/2015 – 31/Jul/2015 (sixteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.06 [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)	23522 km
Bus mileage over the period	2549 km
Working days over the period	15 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	184 hours 5 minutes (197 hours 13 minutes)[1]
Average working hours per day (including stop days)	12 hours 20 minutes
Bus average speed	13.77 km/hr
Idle speed time to all working time ration	58 %[2]
Total Bus fuel consumption over the period	1560 lit
Fuel consumption per hour	7.90 lit/hr
Average fuel consumption	0.61 lit/km
Total Bus additive consumption over the period	0.647 lit
Average additive consumption	254 cc/km
Additive consumption to fuel ration	415 cc per 1000 lit (batch dosing with tank level)

1-As cleared in figure 12, data logger didn't sample on 16th Jul due to technical problem. So average working hours were added to calculated working hours from data logger.
2- Due to RPM sensor technical problem over this period, temperature data were used for idle working time measurement.

Temperature, Pressure and Engine Speed Overview

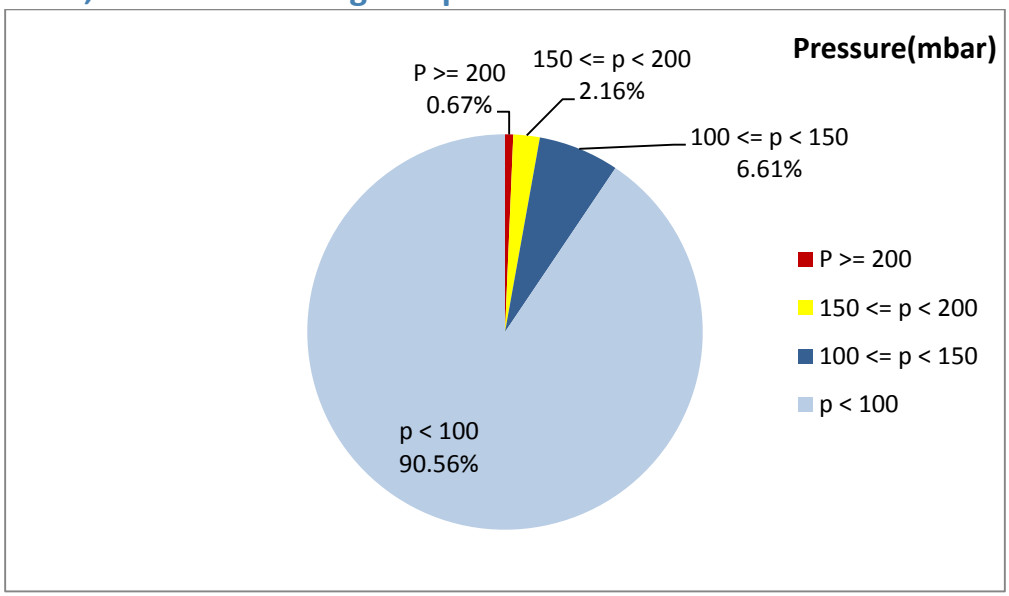


Figure 1- Pressure distribution over the working hours

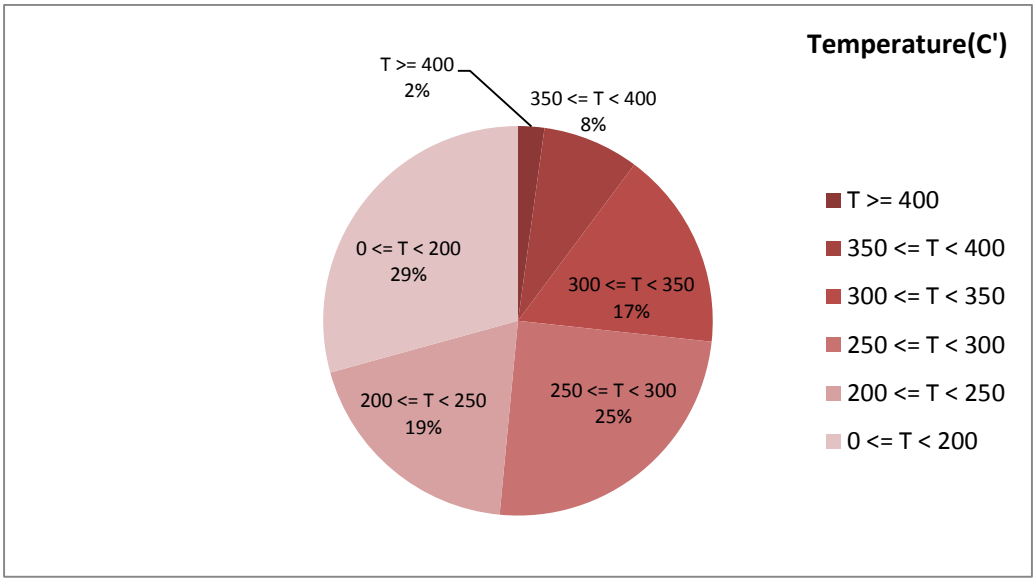


Figure 2-Temperature distribution over the working hours

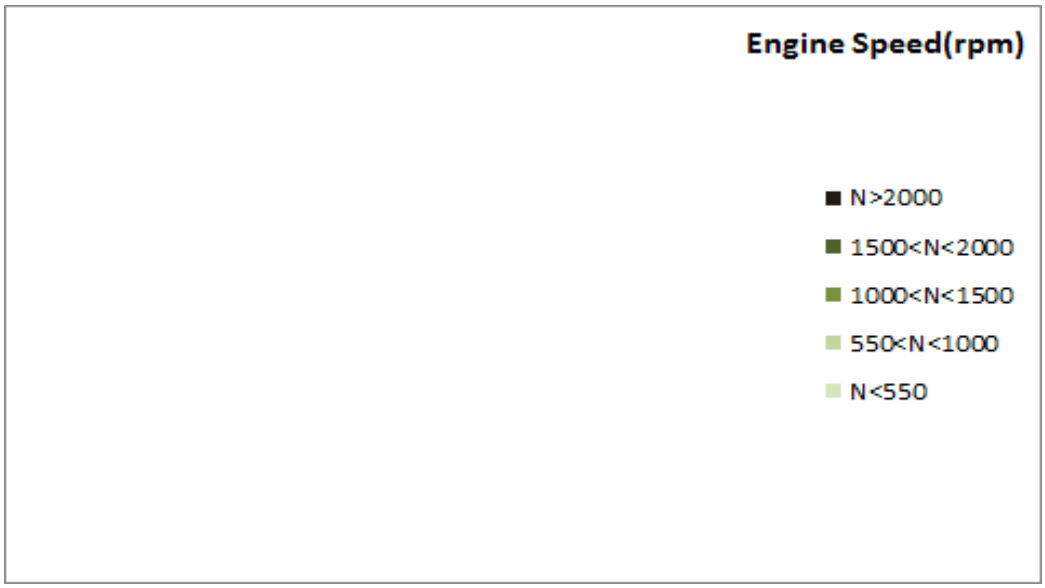


Figure 3- Engine speed distribution over the working hours

Notice: Due to RPM sensor problem during this period, engine speed data were unreliable..

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
255.42	38.99	-

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
304.50	53.06	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
542-50	366-0	-

Detailed Pressure Analysis

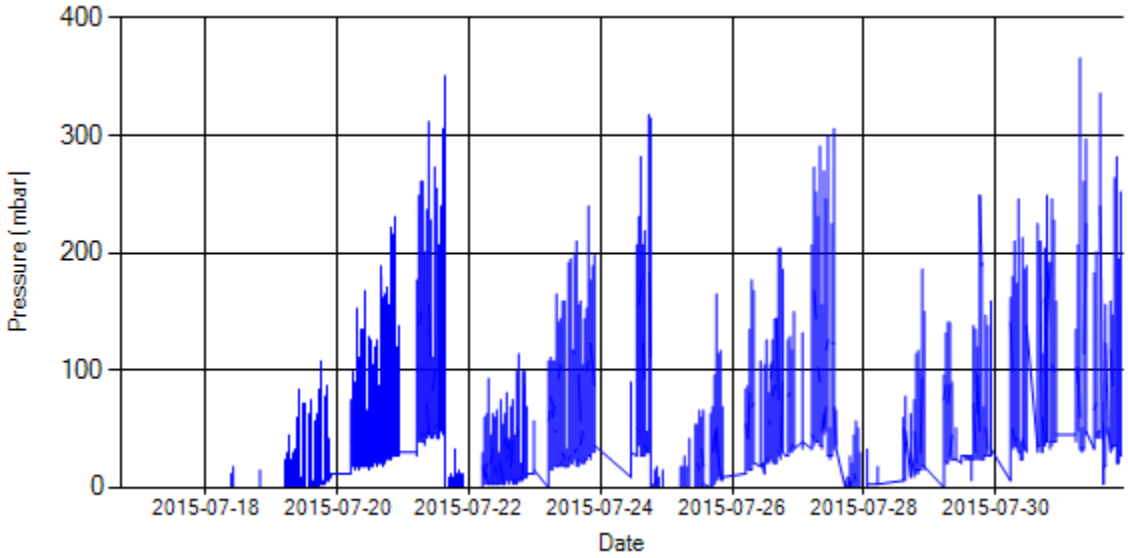


Figure 4- Pressure distribution over the period

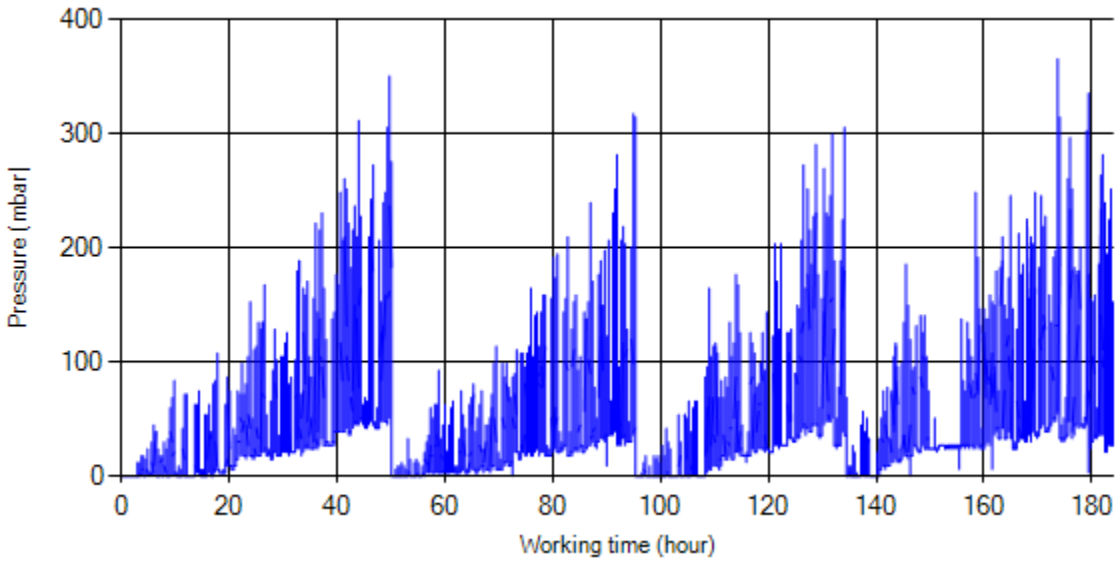


Figure 5- Pressure vs. working hours

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

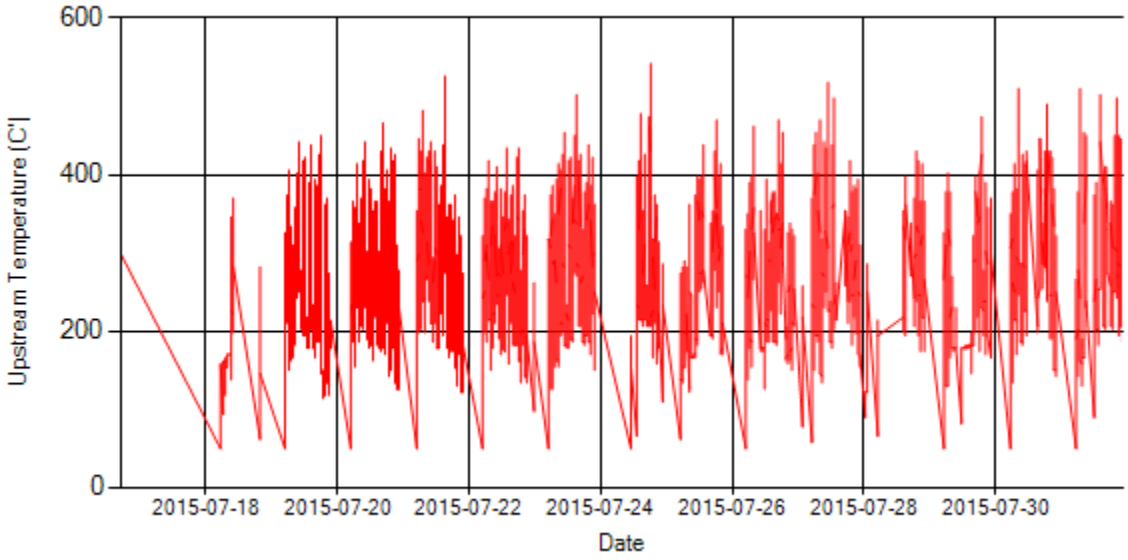


Figure 6- Temperature distribution over the period

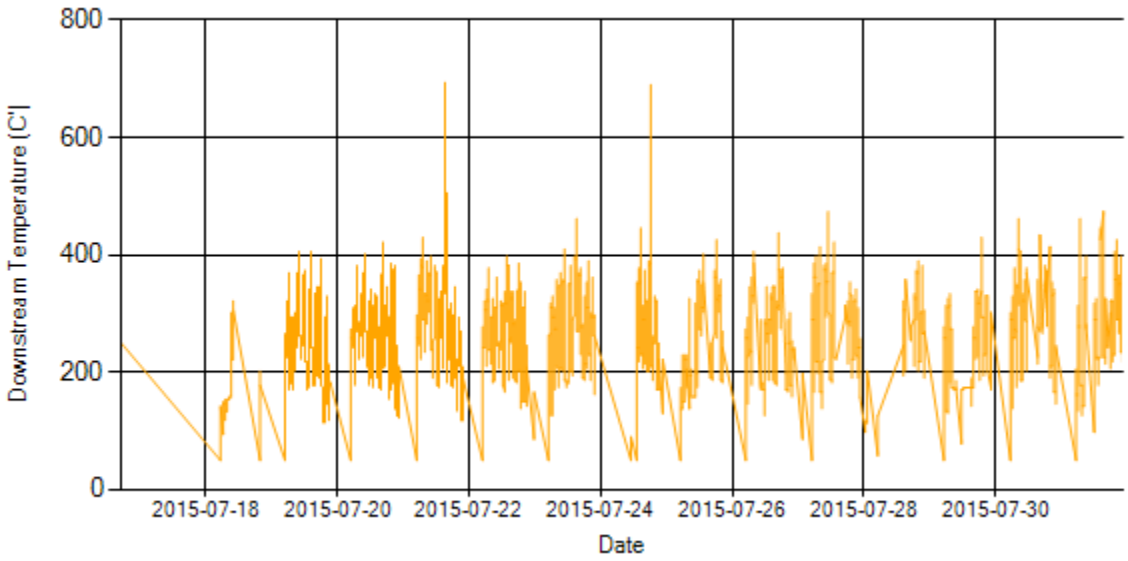


Figure 7- Temperature distribution over the period

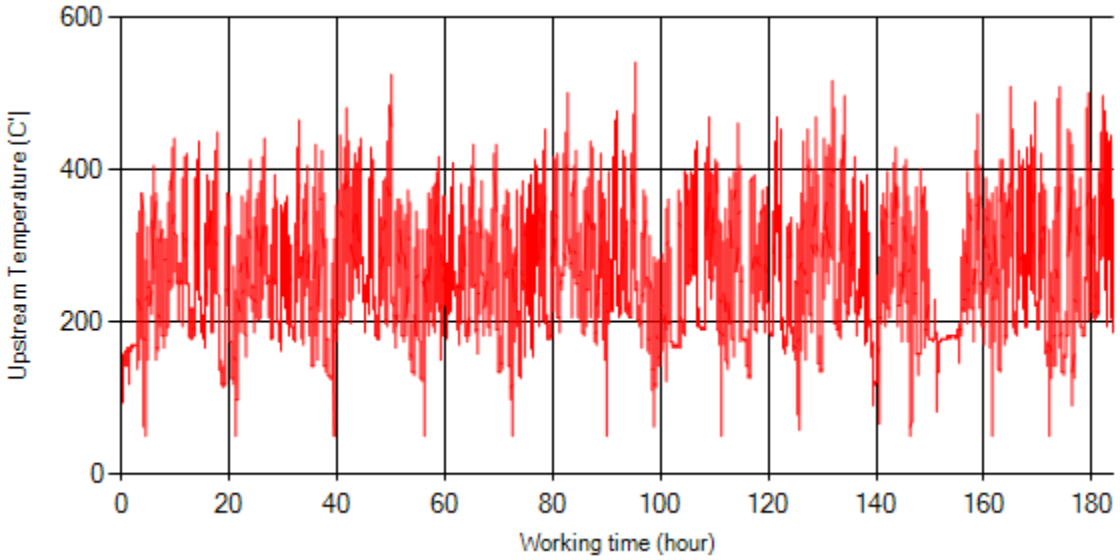


Figure 8- Temperature vs. working hours

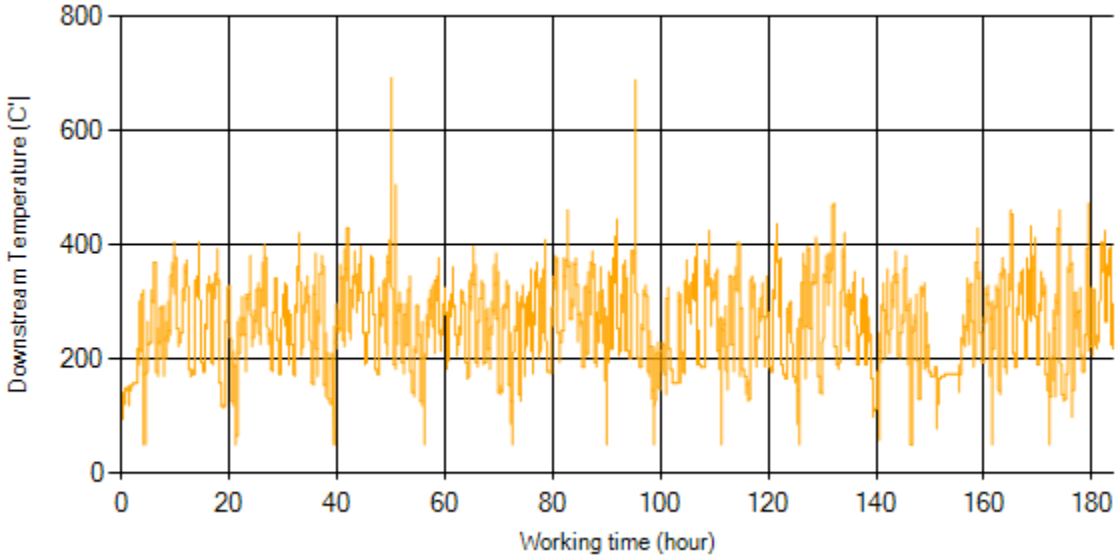


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

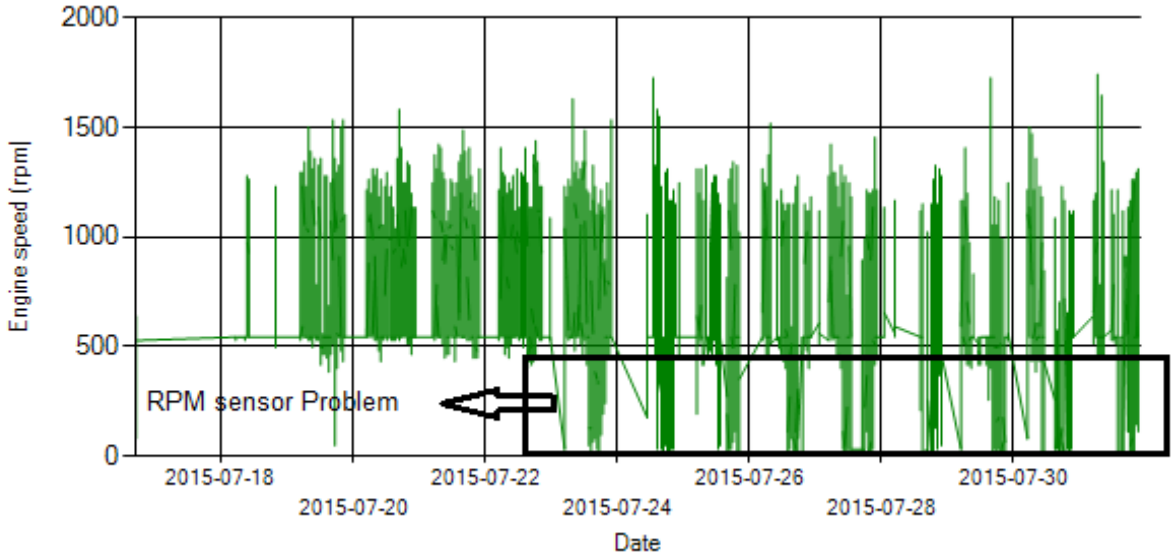


Figure 10- Engine speed distribution over the period

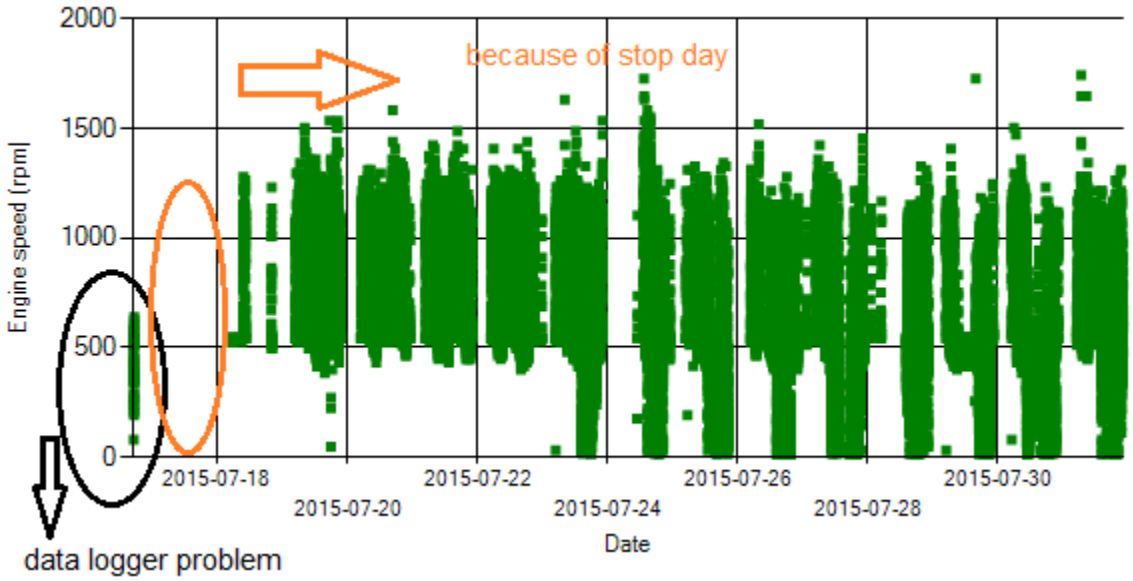


Figure 11- Engine speed diagram for calculating CPK's working days

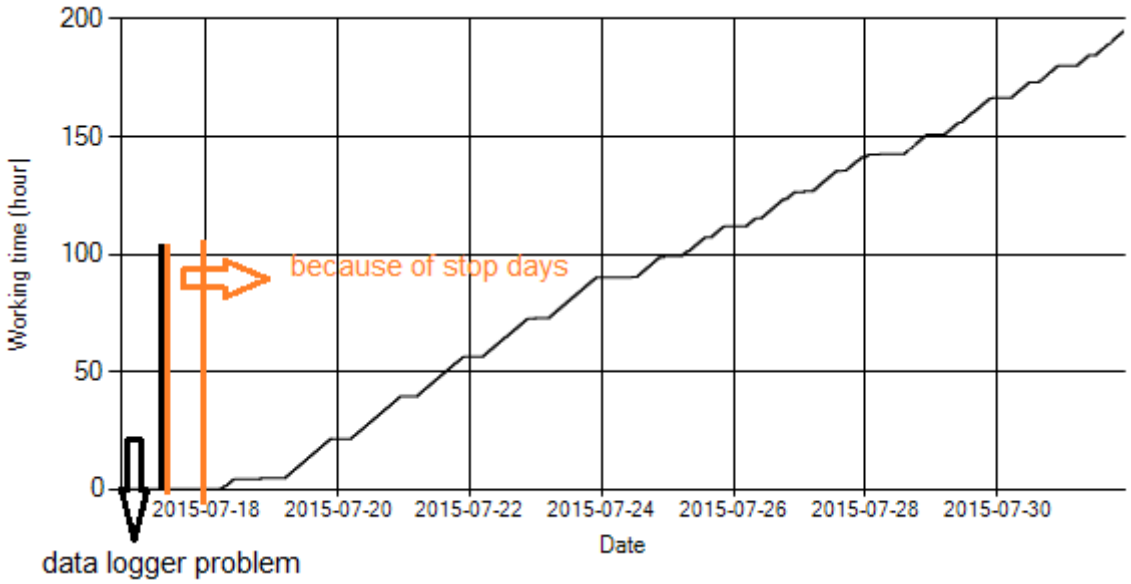


Figure 12- Time diagram for calculating CPK's working days

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

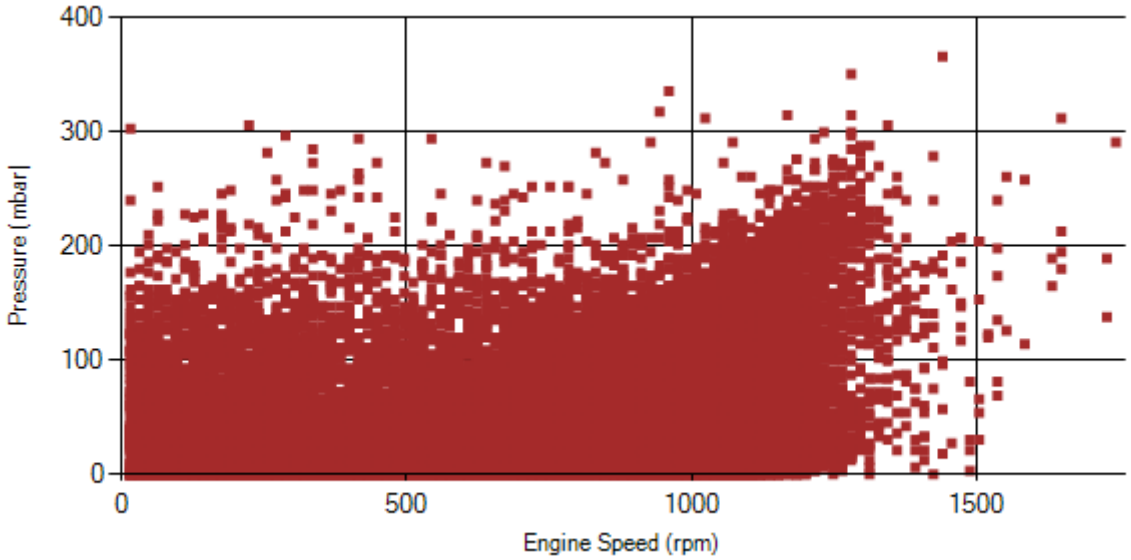


Figure 13- Pressure against engine speed

Notice: Considering RPM sensor problem, this figure data are unreliable.

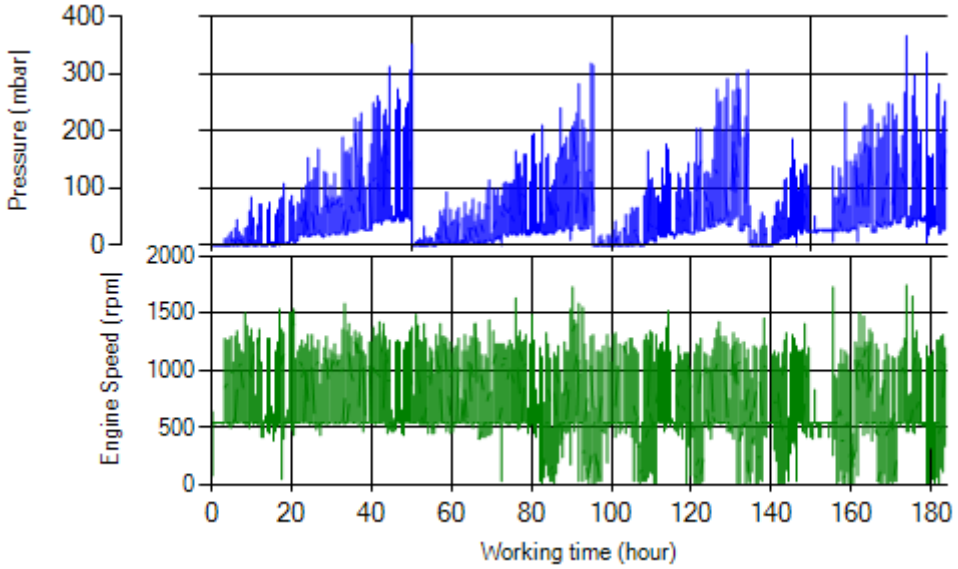


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

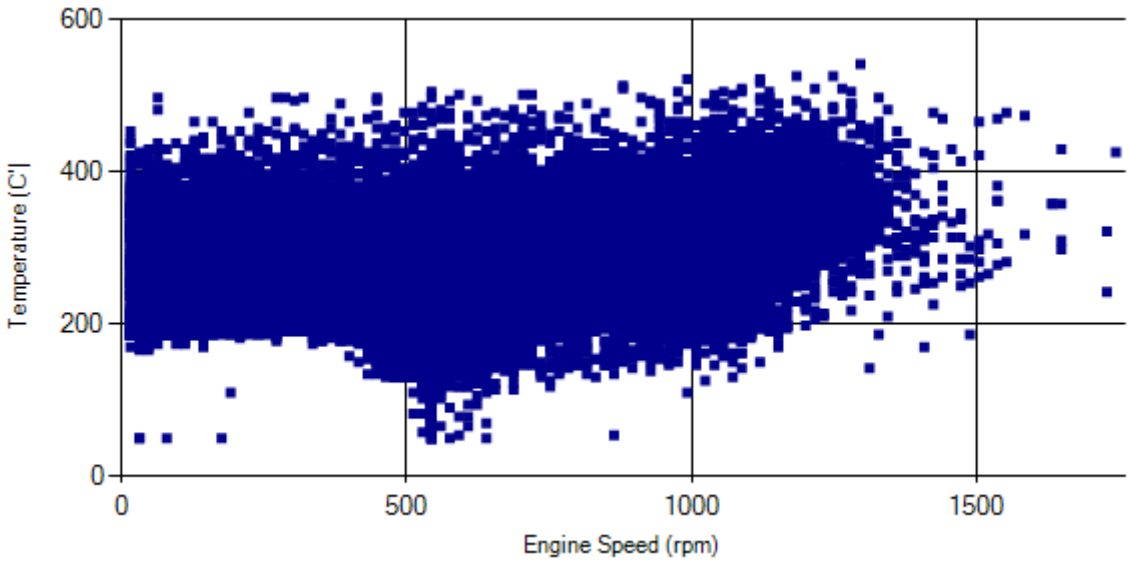


Figure 13- Temperature against engine speed

Notice: Considering RPM sensor problem, this figure data are unreliable.

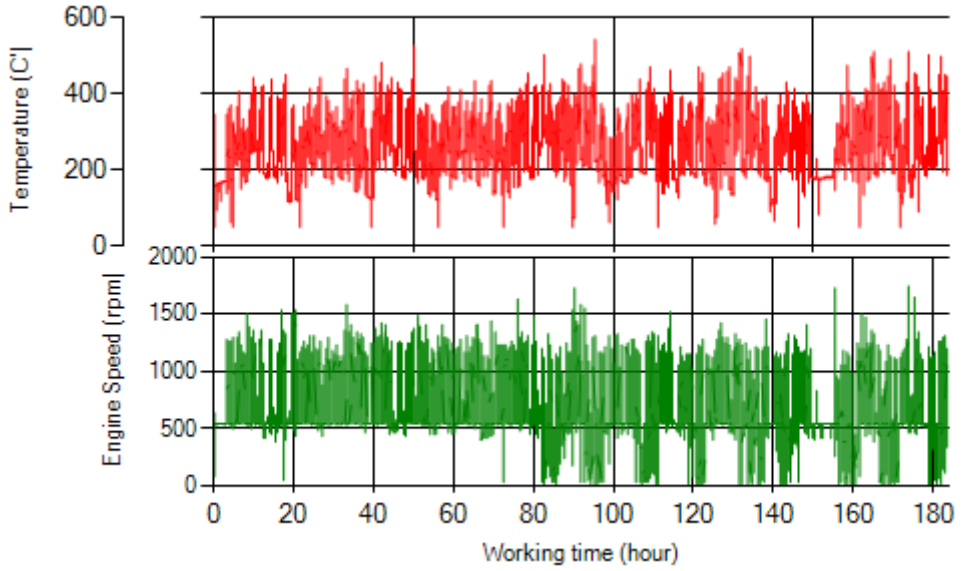


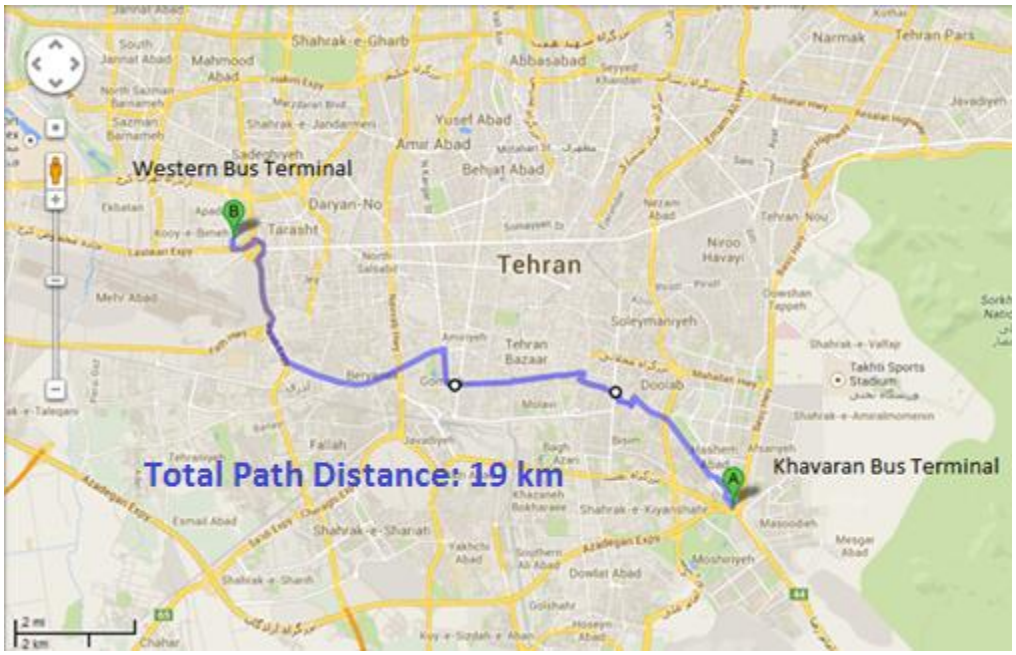
Figure 14- T,N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.67% of total working time pressure is above 200 mbar and 2.83% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 2 % of total working time temperature is above 400℃.

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 producer company	Dinex_02 (Passive system with FBC)
Installation date	2/Jun/2015
Report period	01/Jul/2015 – 15/Jul/2015 (fifteen days)
K value – muffler* upstream	1.8 [m^{-1}]
K value – muffler* downstream	1.8 [m^{-1}]

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 is ready to installation with new working conditions (increasing FBS dosing).

Table 3- Fuel and Additive Consumption Information

Bus mileage over the period	1771 km
Working days over the period	11 days
Stop days	4 days
Working hours over the period	160 hours 14 minutes
Average working hours per day (including stop days)	10 hours 41 minutes
Bus average speed	11.05 Km/hr
Idle speed time to all working time ration	53.18 %*
Total Bus fuel consumption over the period	1161 lit
Fuel consumption per hour	7.25 lit/hr
Average fuel consumption	65 lit/km

*Engine rotational speed for this vehicle when air conditioning system is on, is approximately 784 rpm and without use of cooling system is about 544 rpm.

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	2/Jun/2015
Report period	016/Jul/2015 – 31/Jul/2015 (sixteen days)
K value – muffler* upstream	1.8 $[m^{-1}]$
K value – muffler* downstream	1.8 $[m^{-1}]$

Table 2- Maintenance Table

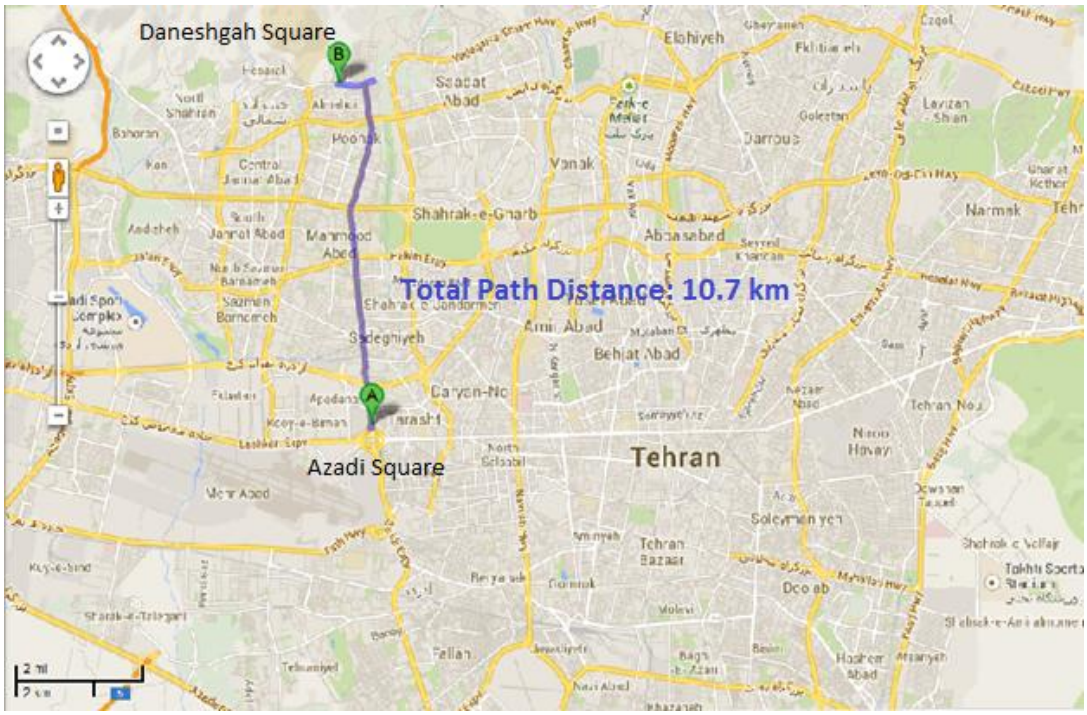
Filter maintenance date	DPF has been removed after two weeks working on Jun 17th. After receiving cleaning machine DPF was cleaned on Aug 10th and is ready to installation with new working conditions (increasing FBS dosing).

Table 3- Fuel and Additive Consumption Information

Bus mileage over the period	2549 km
Working days over the period	16 days
Stop days	0 day
Working hours over the period	255 hours 3 minutes
Average working hours per day (including stop days)	15 hours 56 minutes
Bus average speed	10 Km/hr
idle speed time to all working time ration	45 %*
Total Bus fuel consumption over the period	1705 lit
Fuel consumption per hour	6.7 lit/hr
Average fuel consumption	0.67 lit/km

*Engine rotational speed for this vehicle when air conditioning system is on, is approximately 784 rpm and without use of cooling system is about 544 rpm.

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/Jul/2015 – 15/Jul/2015 (fifteen days)
K value - DPF upstream	1.90 [1/m]
K value – DPF downstream	0.04 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been working from installation 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)	22085 km
Bus mileage over the period	2636 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	234 hours, 4 minutes
Average working hours per day (including stop days)	15 hour,35 minutes
Bus average speed	11.39 km/hr
idle speed time to all working time ration	57.95 %
Total Bus fuel consumption over the period	1783 lit
Fuel consumption per hour	8.04 lit/hr
Average fuel consumption	0.68 lit/km
Total Bus additive consumption over the period	0.749 lit
Average additive consumption	284 cc/km
Additive consumption to fuel ration	420 cc per 1000 lit (batch dosing with tank level)

Notice: 550±50 RPM was considered as idle working speed.

Temperature, Pressure and Engine Speed Overview

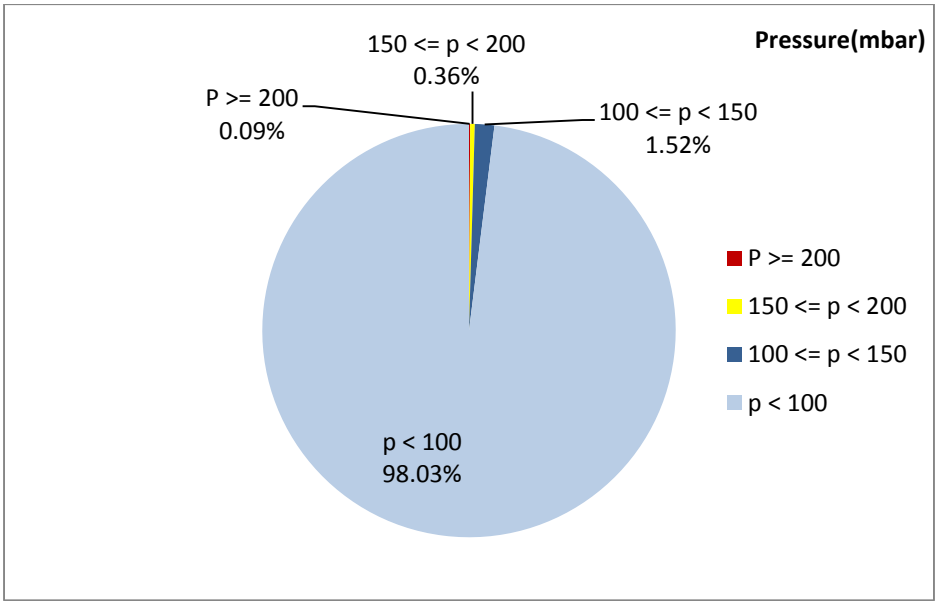


Figure 1- Pressure distribution over the working hours

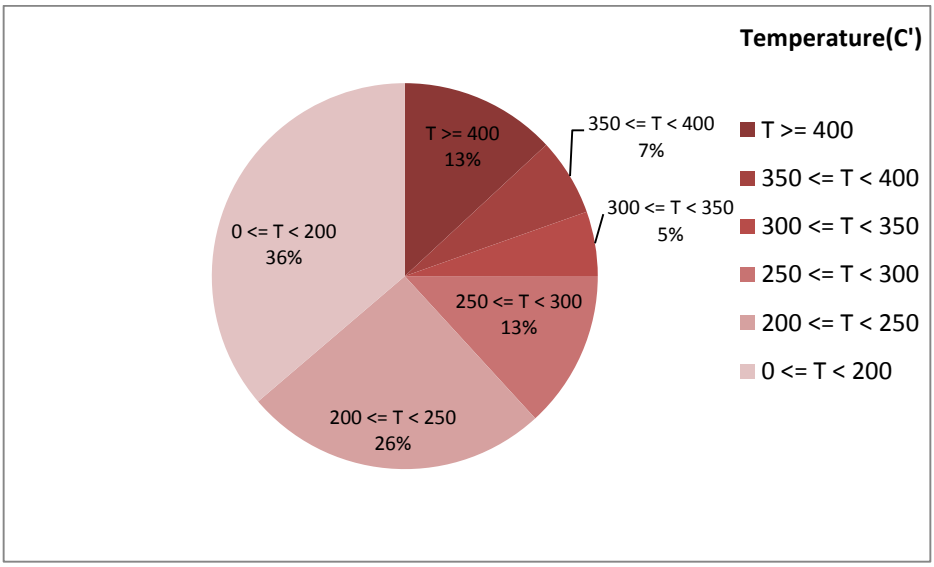


Figure 2-Temperature distribution over the working hours

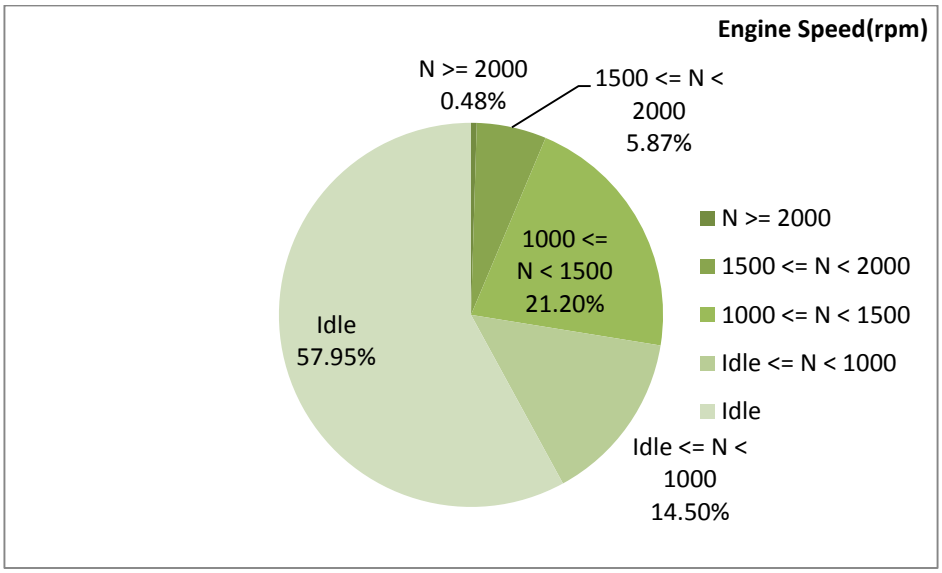


Figure 3- Engine speed distribution over the working hours

Notice: Engine speed below 600 rpm assumed as idle speed.

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
249.19	17.62	786

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
302.58	35.28	1145

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
554-50	264-0	2448-256

Detailed Pressure Analysis

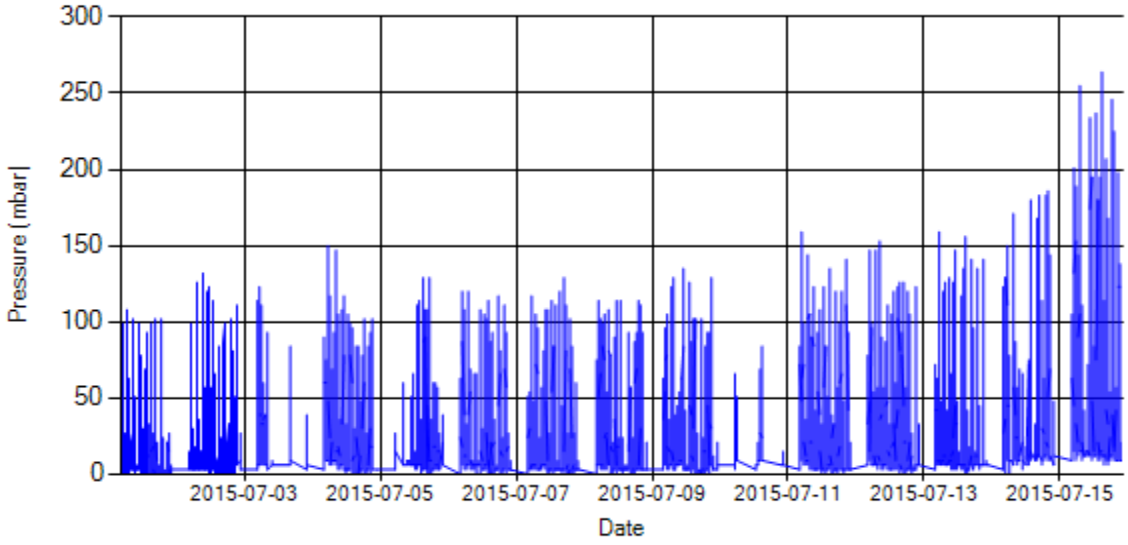


Figure 4- Pressure distribution over the period

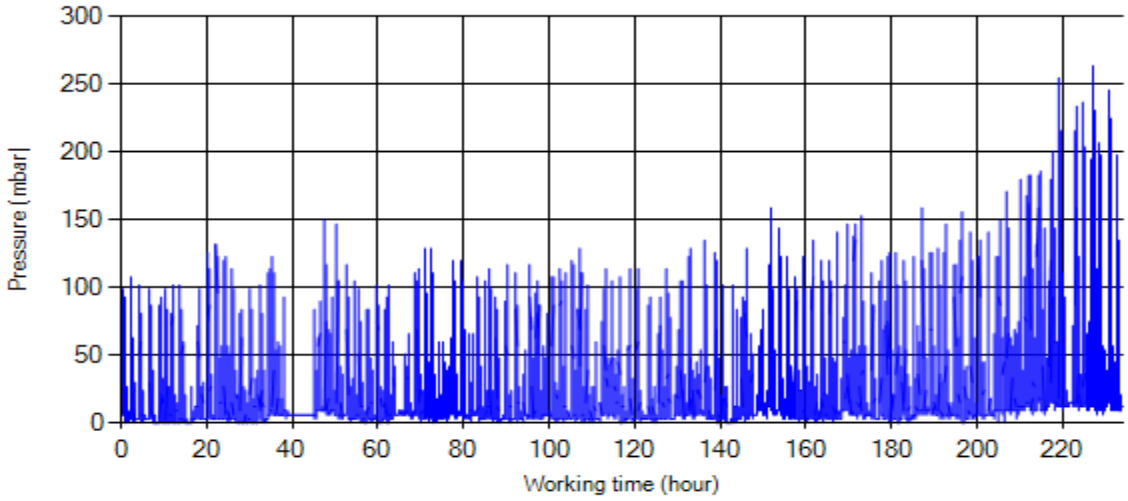


Figure 5- Pressure vs. working hours

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.
Notice: Due to some technical problem related to bus, additive's hose was disconnected and system worked without additive from 14 to 16 Jul.

Detailed Temperature Analysis

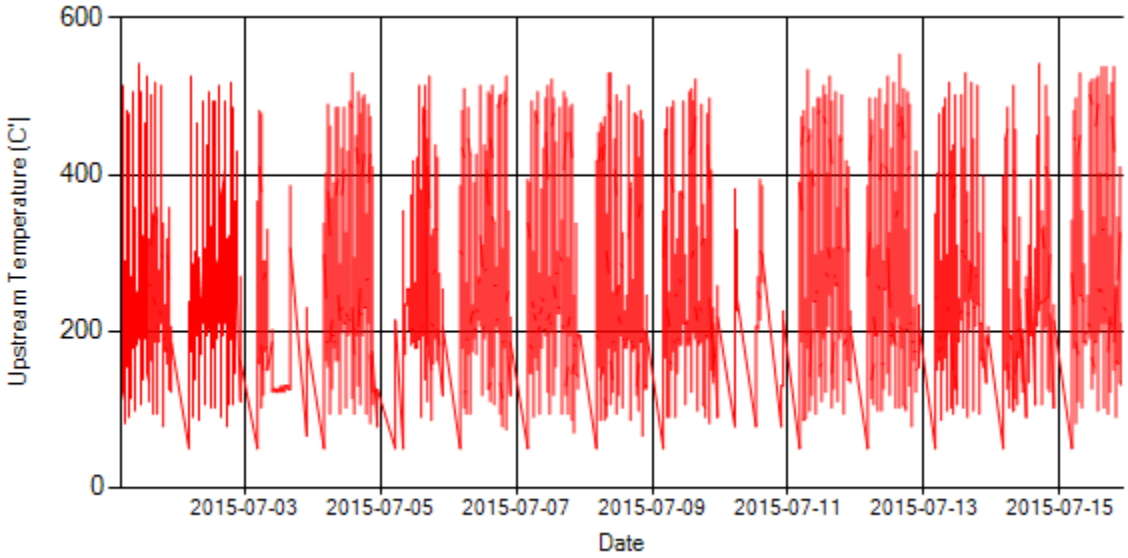


Figure 6- Temperature distribution over the period

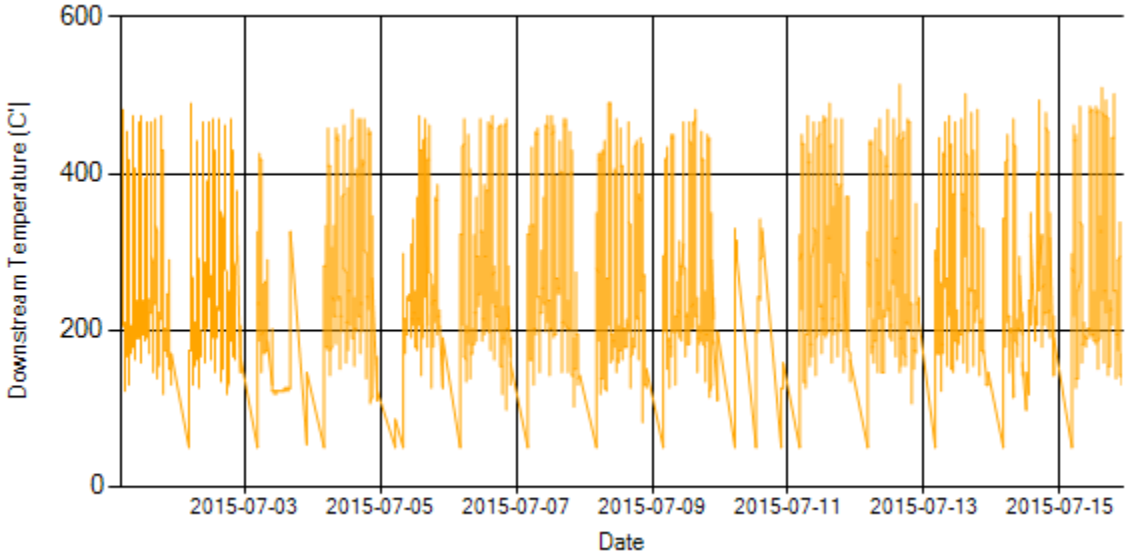


Figure 7- Temperature distribution over the period

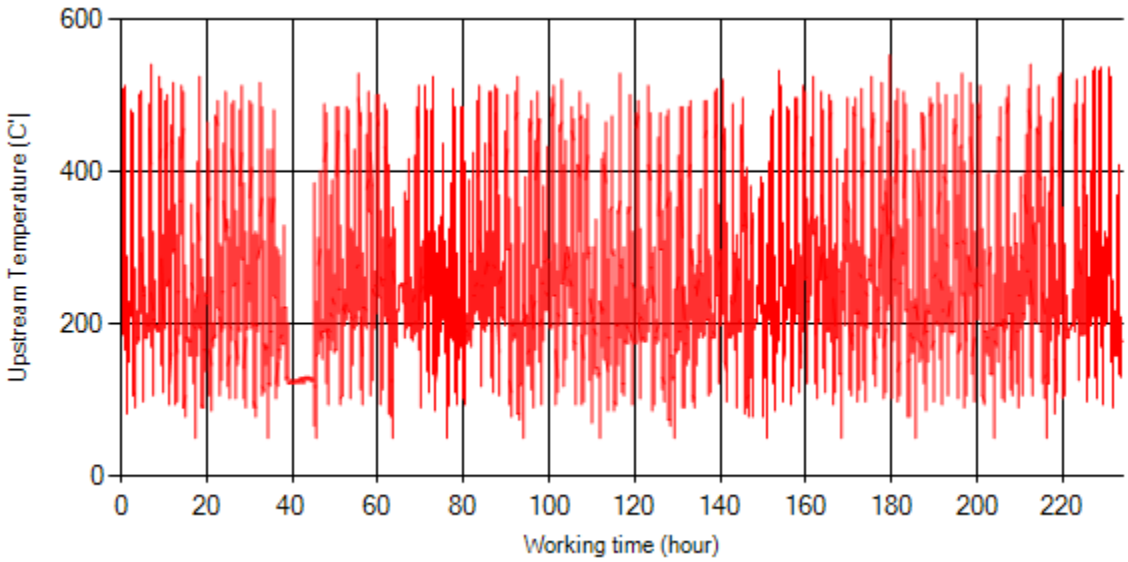


Figure 8- Temperature vs. working hours

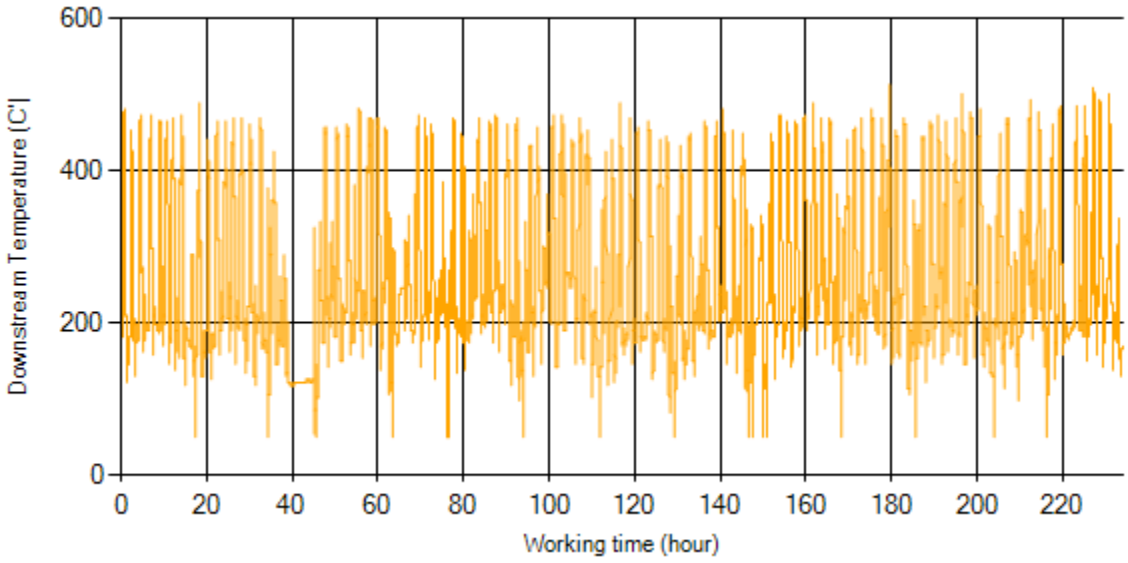


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

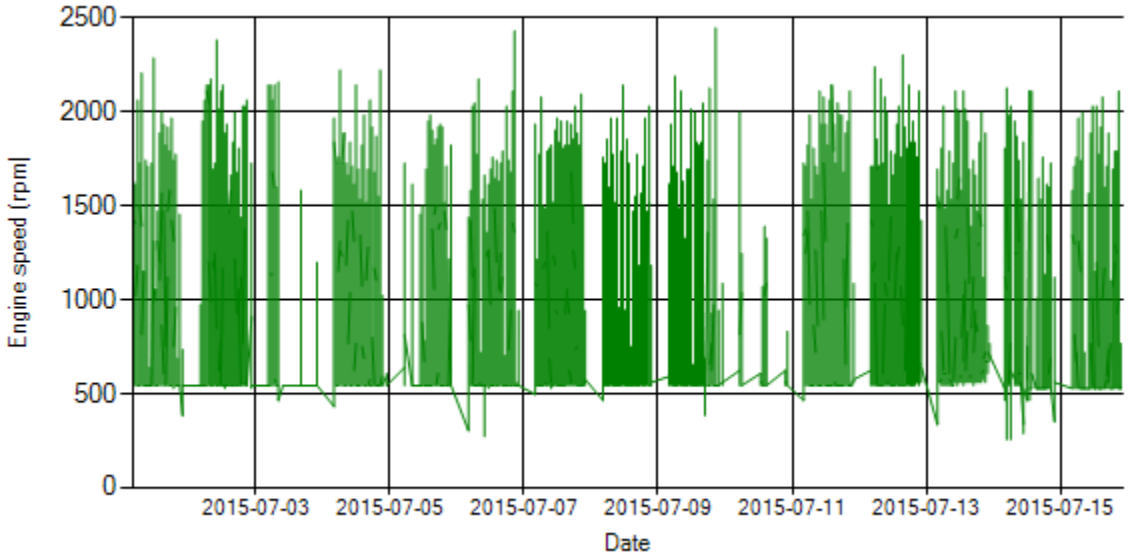


Figure 10- Engine speed distribution over the period

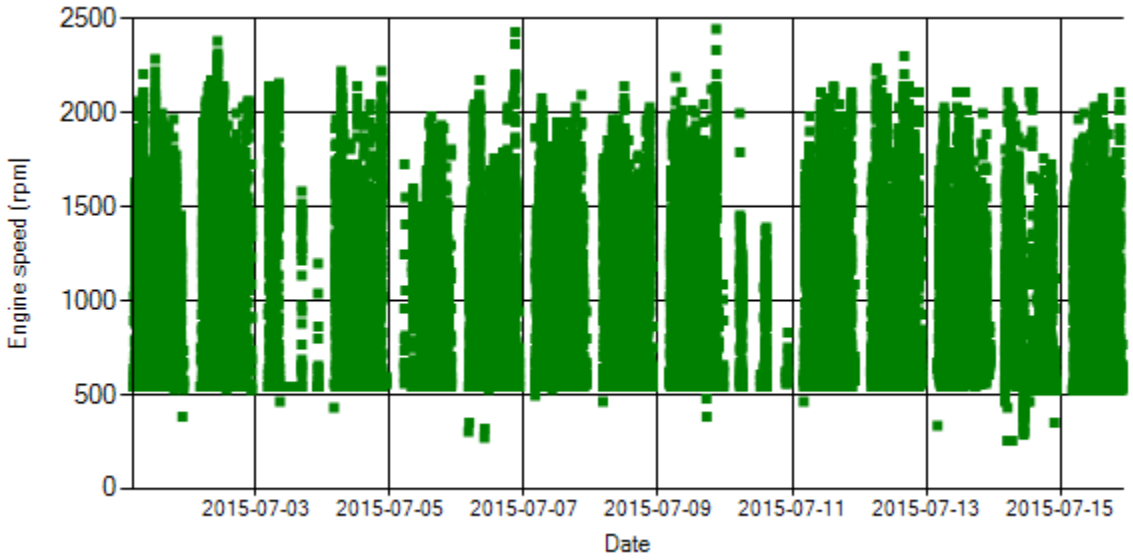


Figure 11- Engine speed diagram for calculating CPK's working days

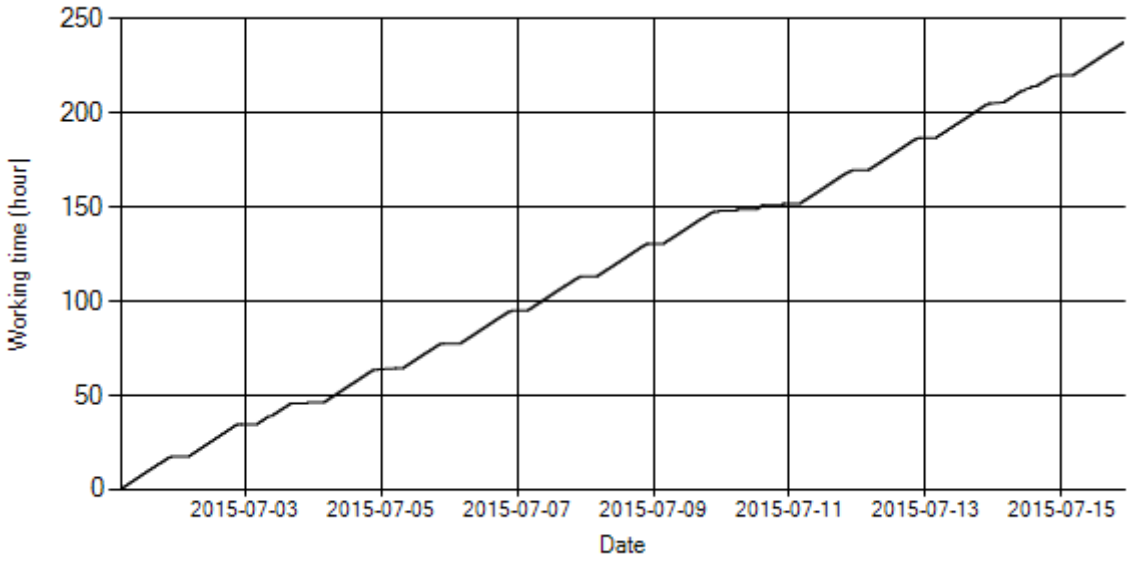


Figure 12- Time diagram for calculating CPK's working days

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- working day can't be seen.

Pressure-Engine Speed diagrams

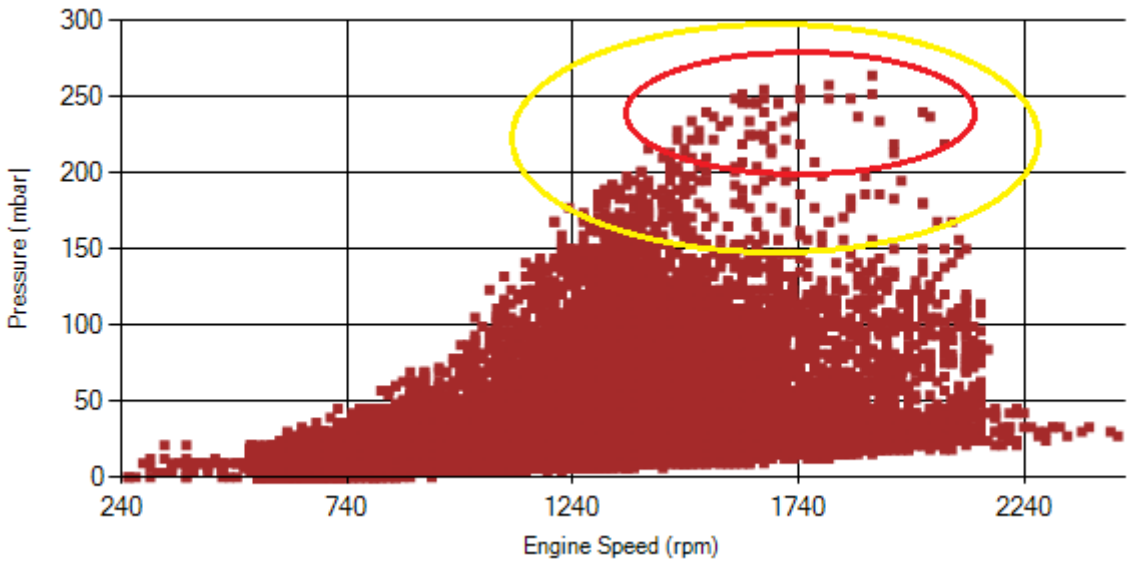


Figure 13- Pressure against engine speed

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

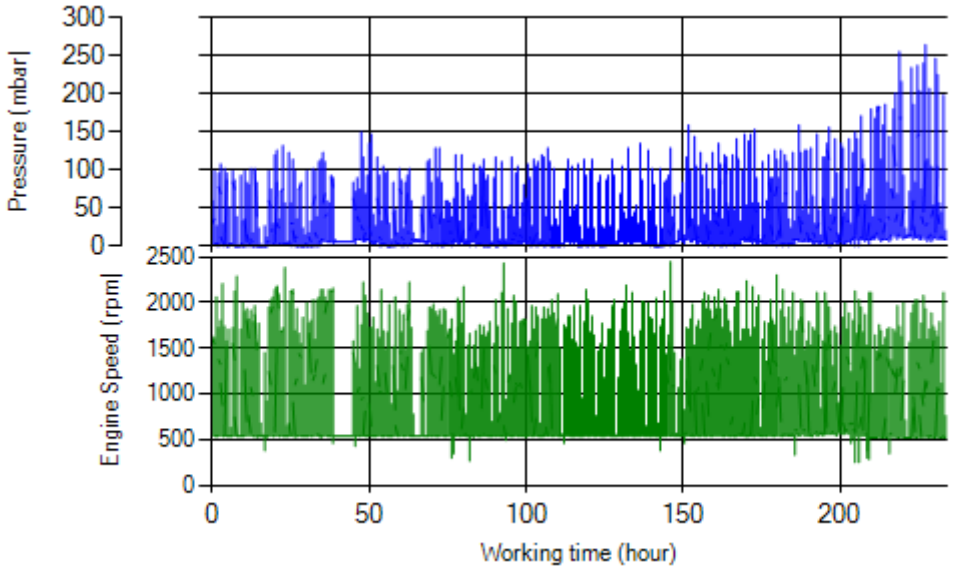


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

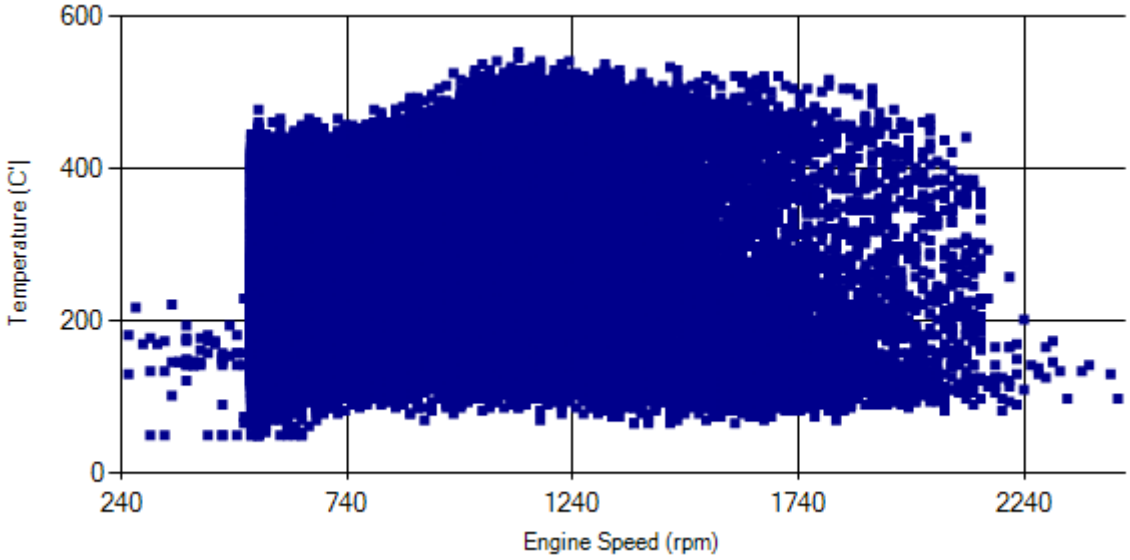


Figure 15- Temperature against engine speed

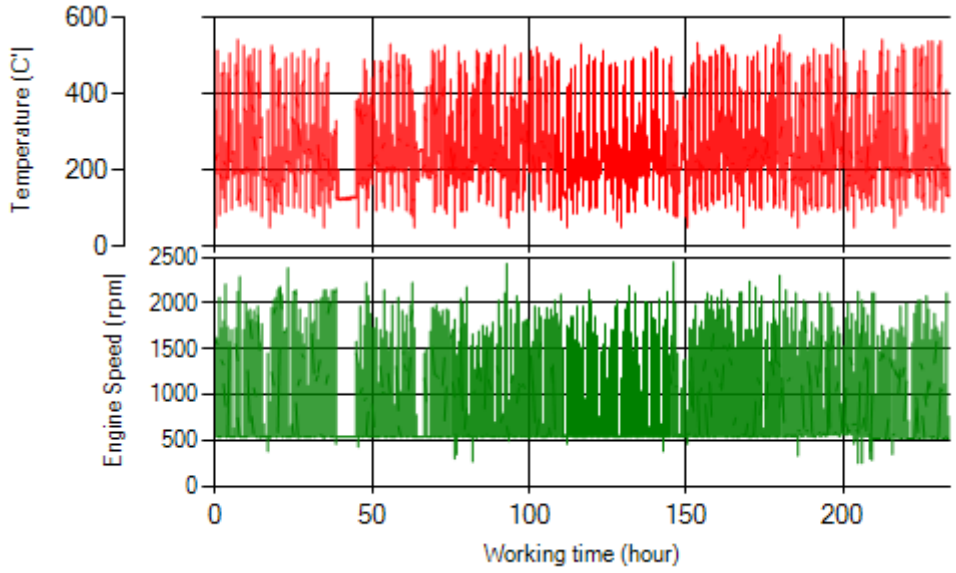


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.09% of total working time pressure is above 200 mbar and 0.45% 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℃.
- This vehicle operates in line 10, so due to path characteristic of this line, engine operates in high speed.

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

ASA Azmoon Sanat Arvin	Document Number: DPF2015072/1 Date: 15/Aug/2015

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/Jul/2015 – 31/Jul/2015 (sixteen days)
K value - DPF upstream	1.90 [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.

Notice: Due to some technical problem related to bus, additive's hose was disconnected and system worked without additive from 14 to 16 Jul. Considering HJS company recommendation filter was cleaned on Jul 22nd.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	23917 km
Bus mileage over the period	1832 km
Working days over the period	11 days
Stop days	5 days
Data logger working days	11 days
Working hours over the period	157 hours 21 minutes
Average working hours per day (including stop days)	9 hours 49 minutes
Bus average speed	11.64 km/hr
idle speed time to all working time ration	55%
Total Bus fuel consumption over the period	1225 lit
Fuel consumption per hour	7.78 lit/hr
Average fuel consumption	0.67 lit/km
Total Bus additive consumption over the period	0.521 lit
Average additive consumption	284 cc/km
Additive consumption to fuel ration	425 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

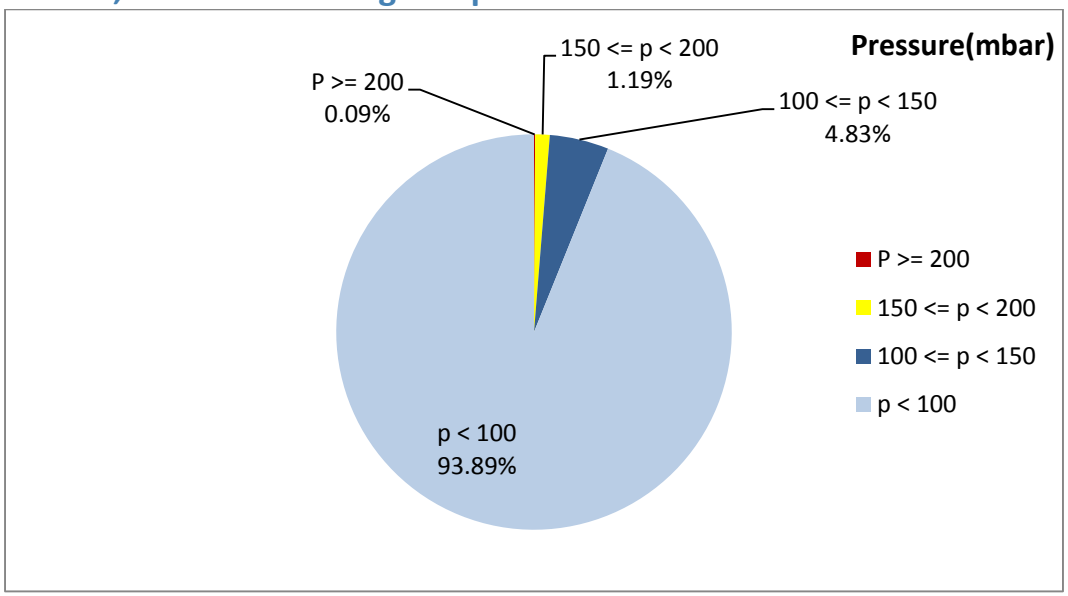


Figure 1- Pressure distribution over the working hours

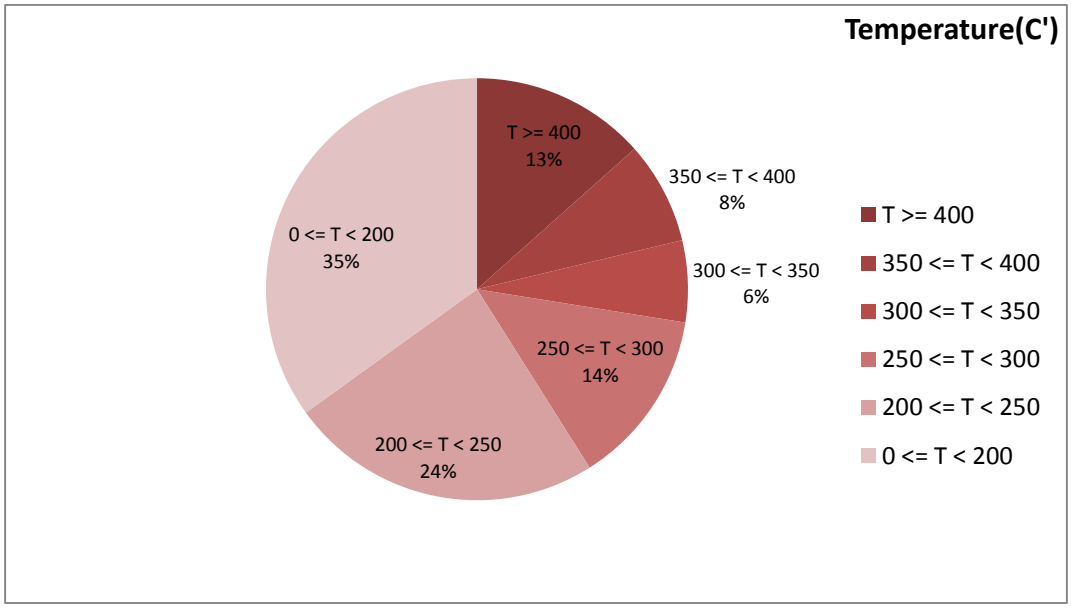


Figure 2-Temperature distribution over the working hours

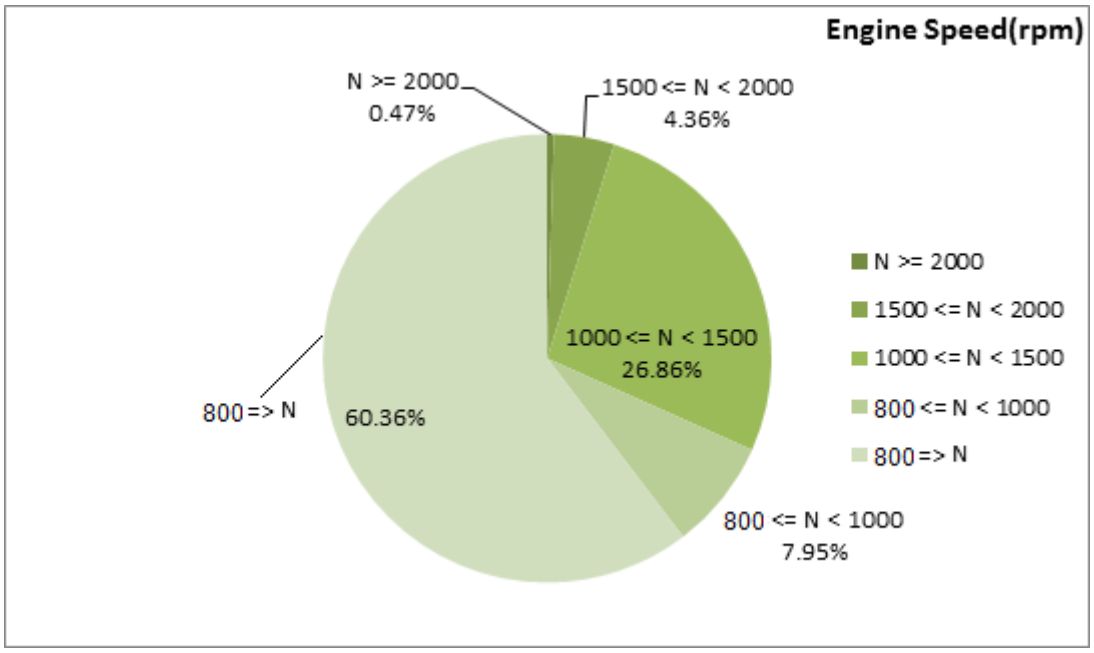


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
254.76	26.65	866

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
314.45	54.52	1125

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
590-50	252-0	2240-256

Detailed Pressure Analysis

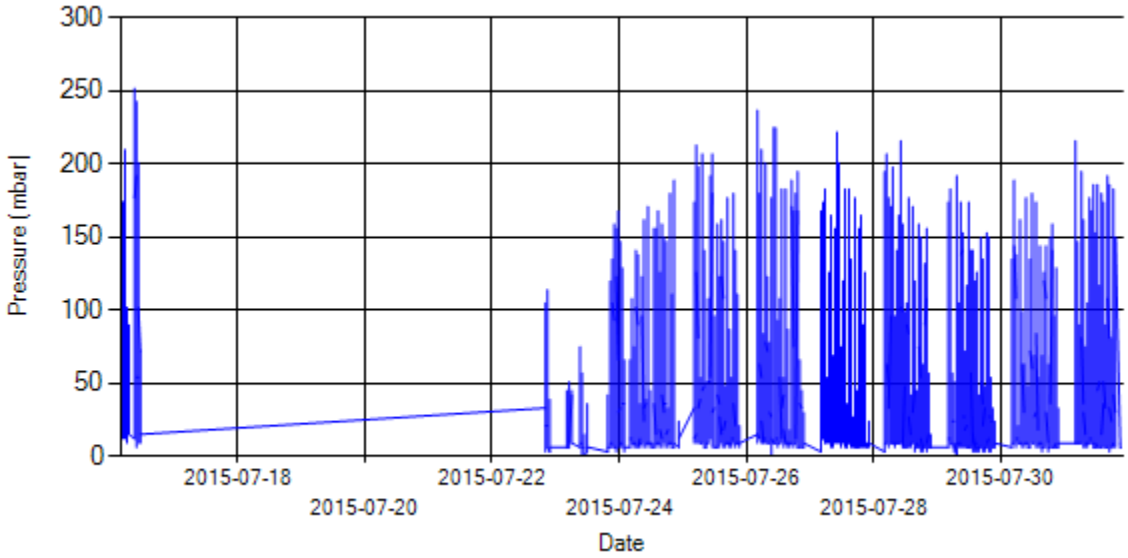


Figure 4- Pressure distribution over the period

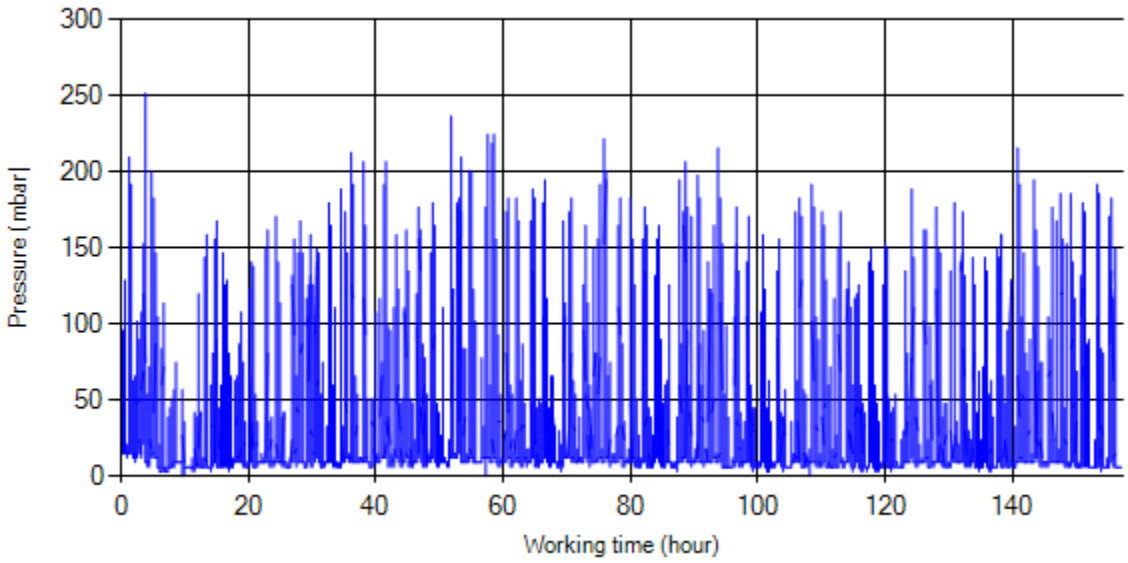


Figure 5- Pressure vs. working hours

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

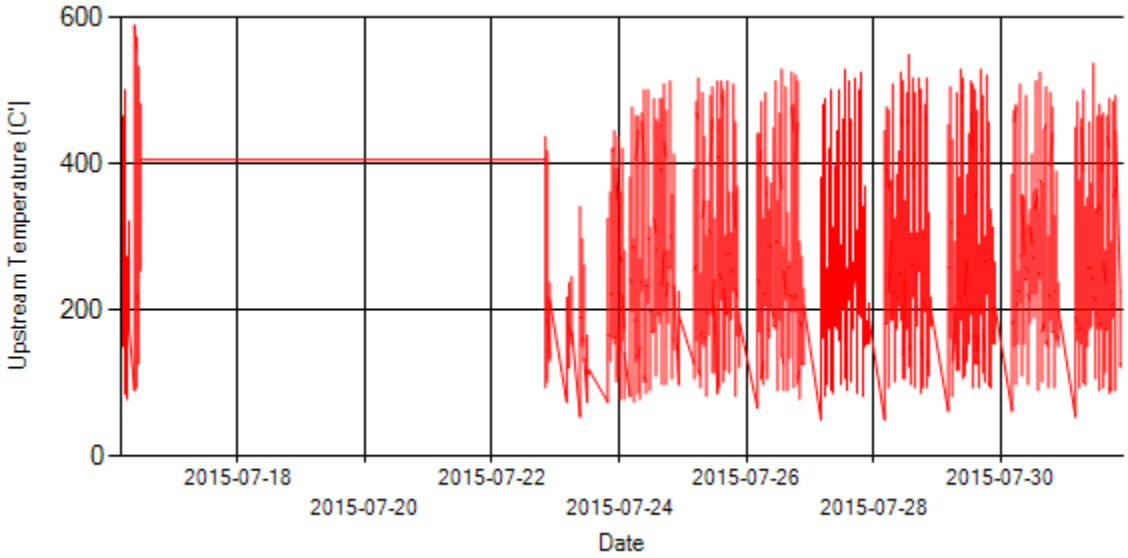


Figure 6- Temperature distribution over the period

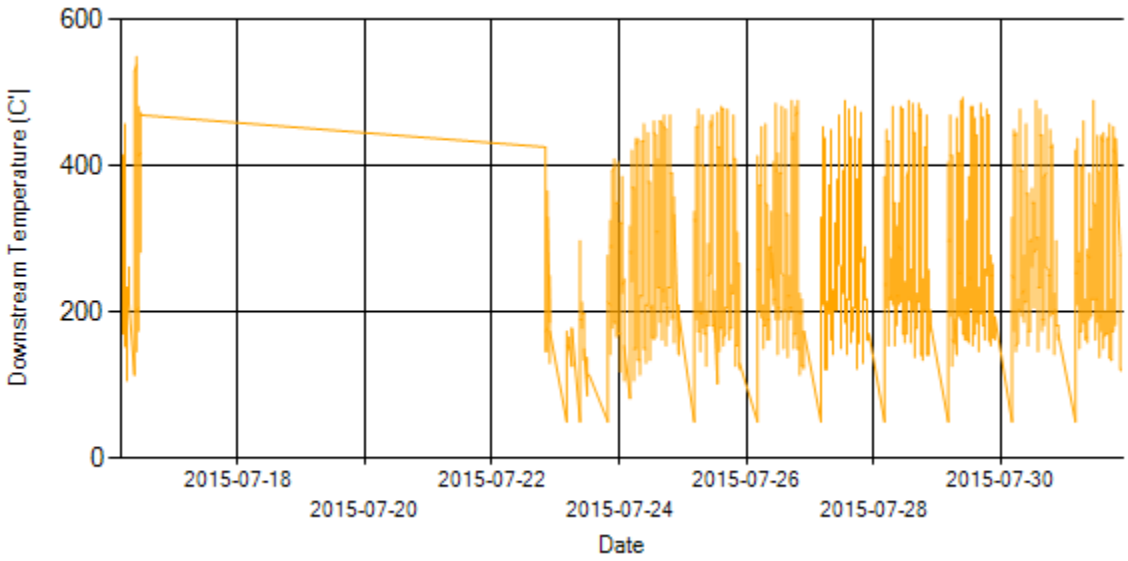


Figure 7- Temperature distribution over the period

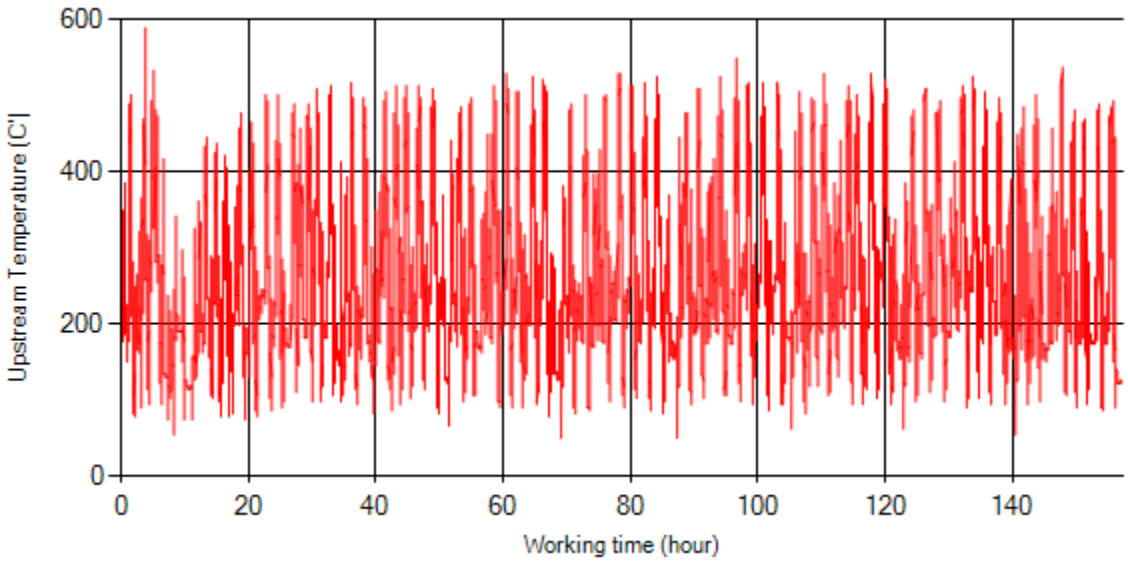


Figure 8- Temperature vs. working hours

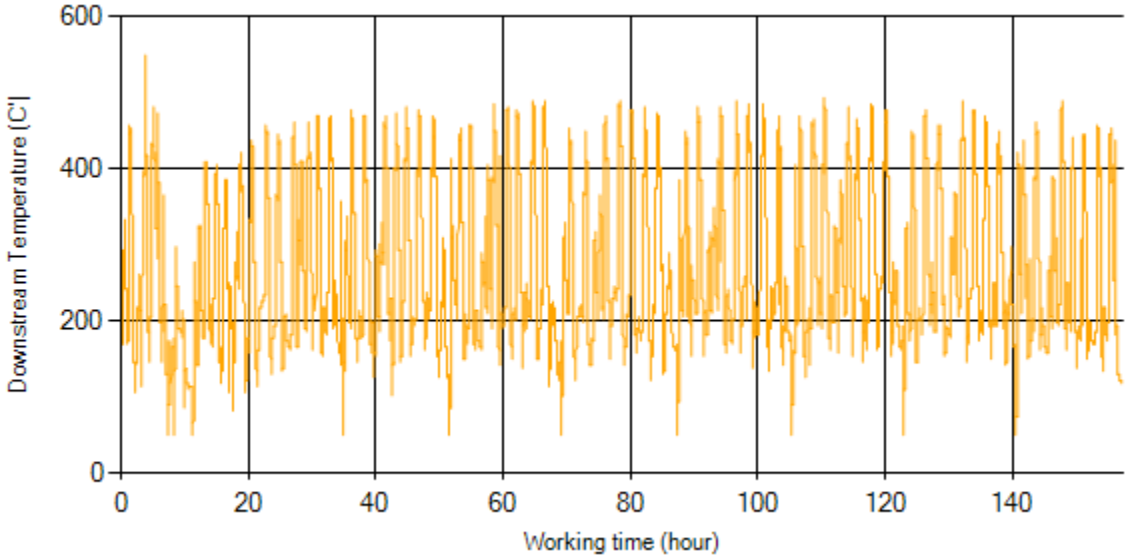


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

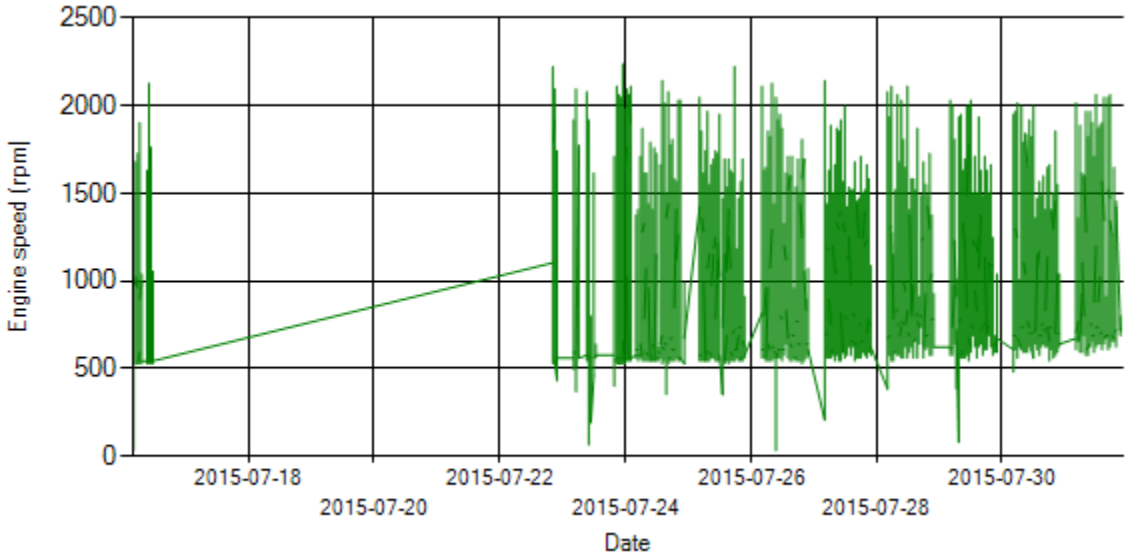


Figure 10- Engine speed distribution over the period

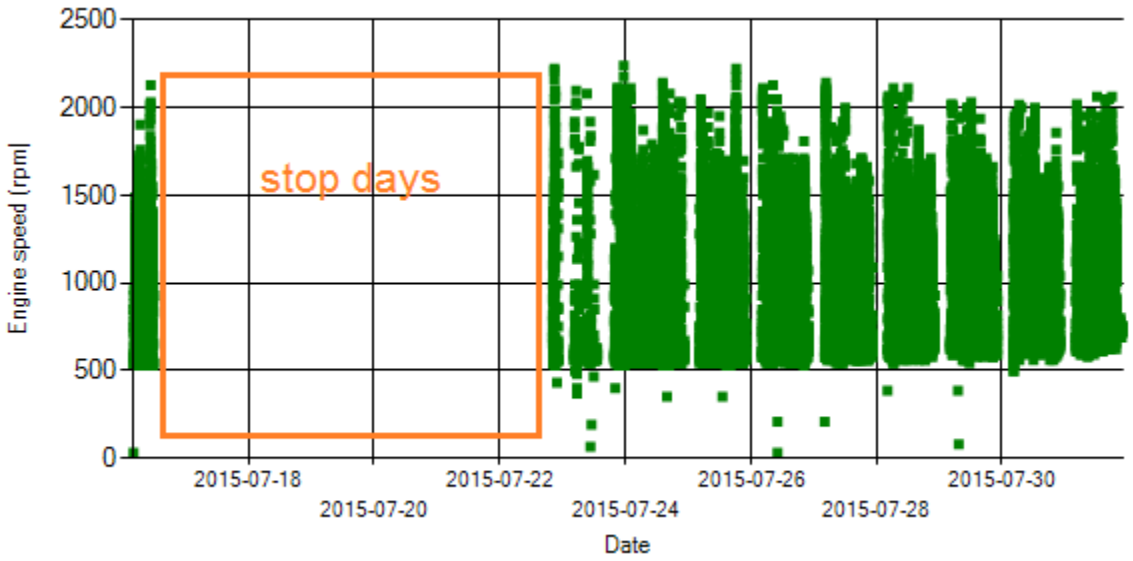


Figure 11- Engine speed diagram for calculating CPK's working days

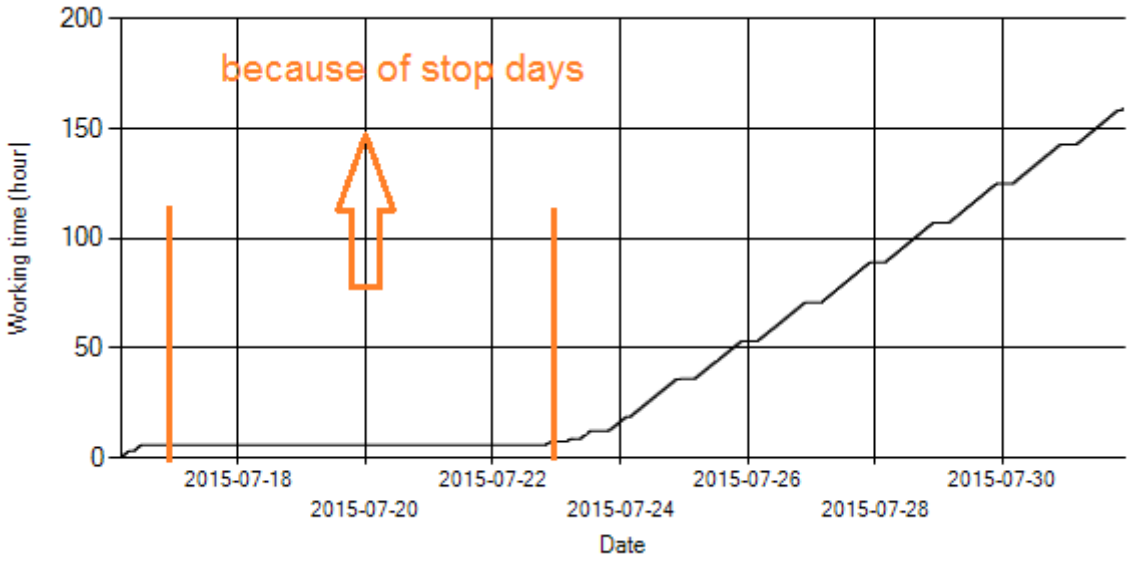


Figure 12- Time diagram for calculating CPK's working days

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

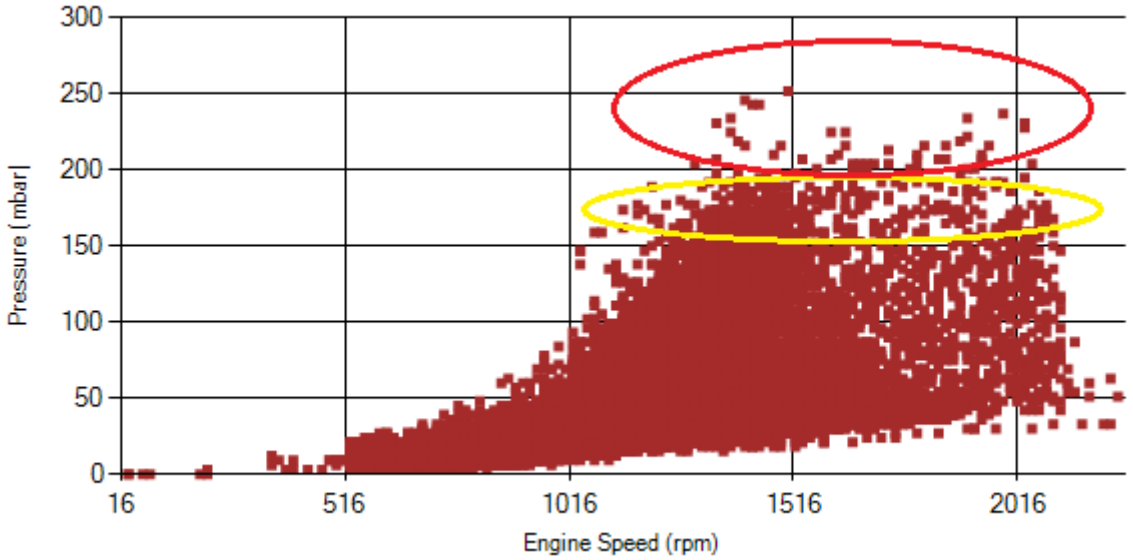


Figure 13- Pressure against engine speed

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

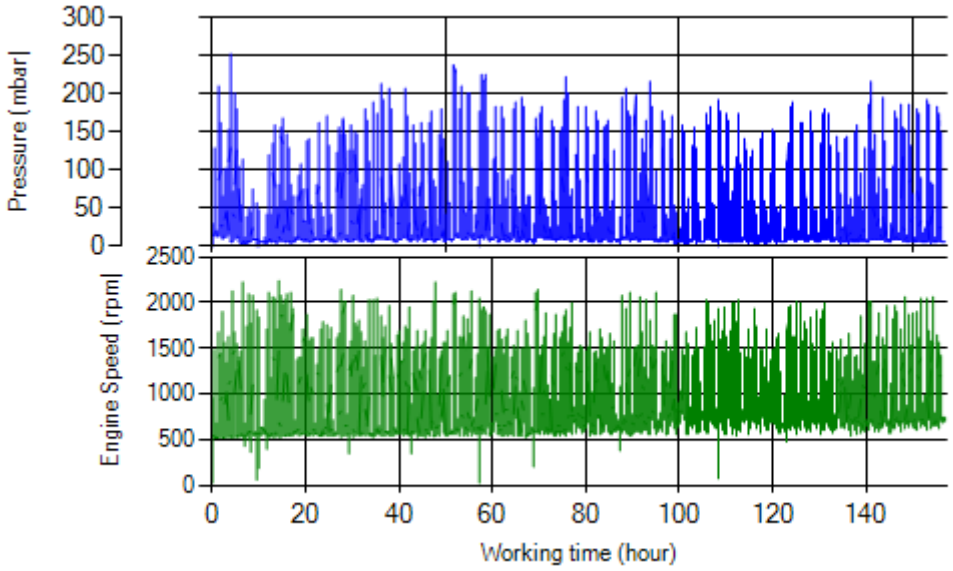


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

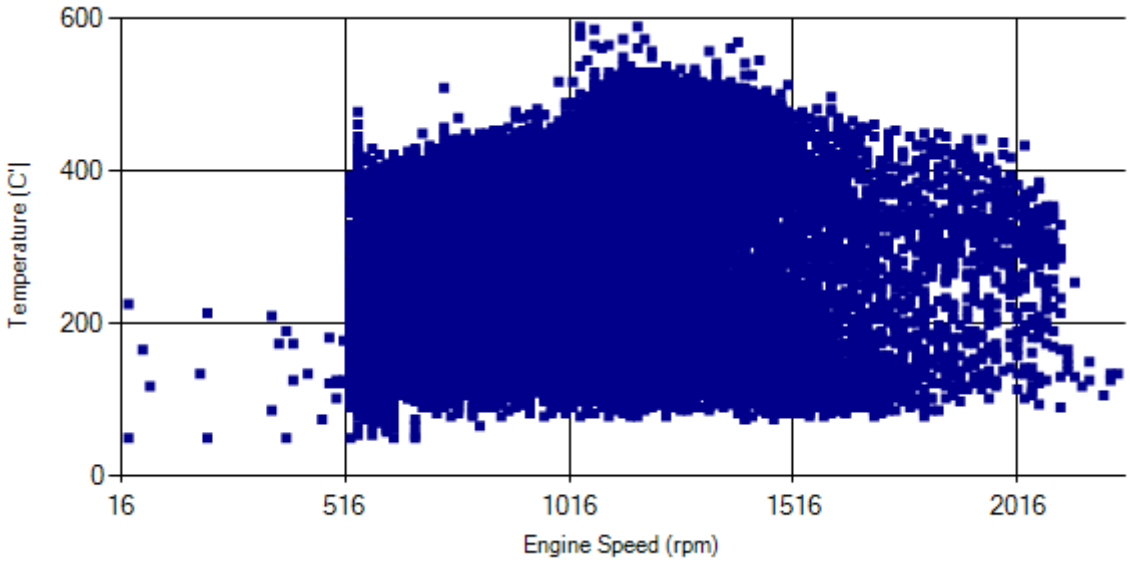


Figure 13- Temperature against engine speed

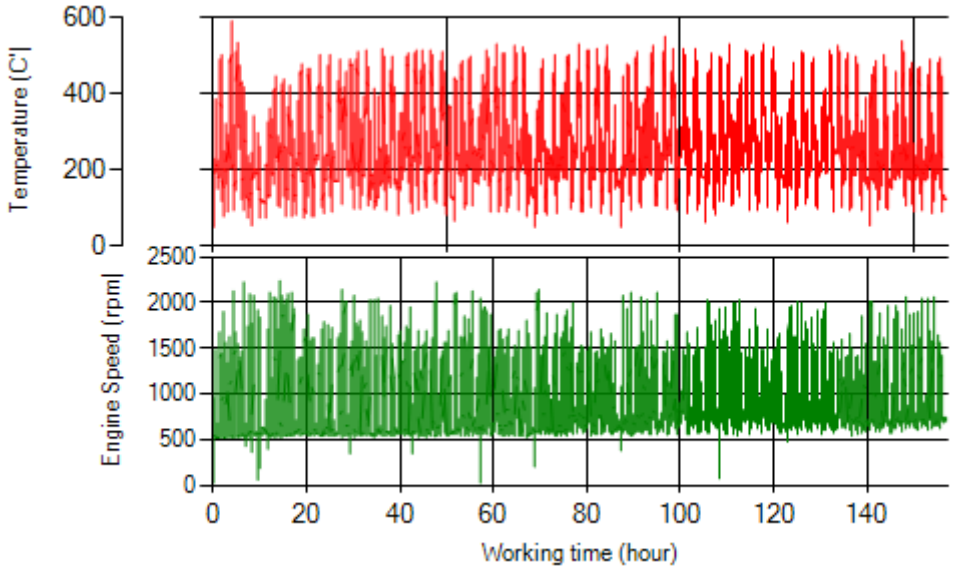


Figure 14- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.09% of total working time pressure is above 200 mbar and 1.18% 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 21% above 350℃.
- This vehicle operates in line 10, so due to path characteristic of this line, engine operates in high speed.

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

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