DPF FEASIBLITY STUDY REPORT

TEHRAN-IRAN

DPFs' Monthly Operation Report

Report Period: 01/Jun/2015 – 30/Jun/2015 (second edition)

Documents Number: DPF2015061/2, DPF215062/2

Contents:
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Detailed Reports

Installed DPFs:

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

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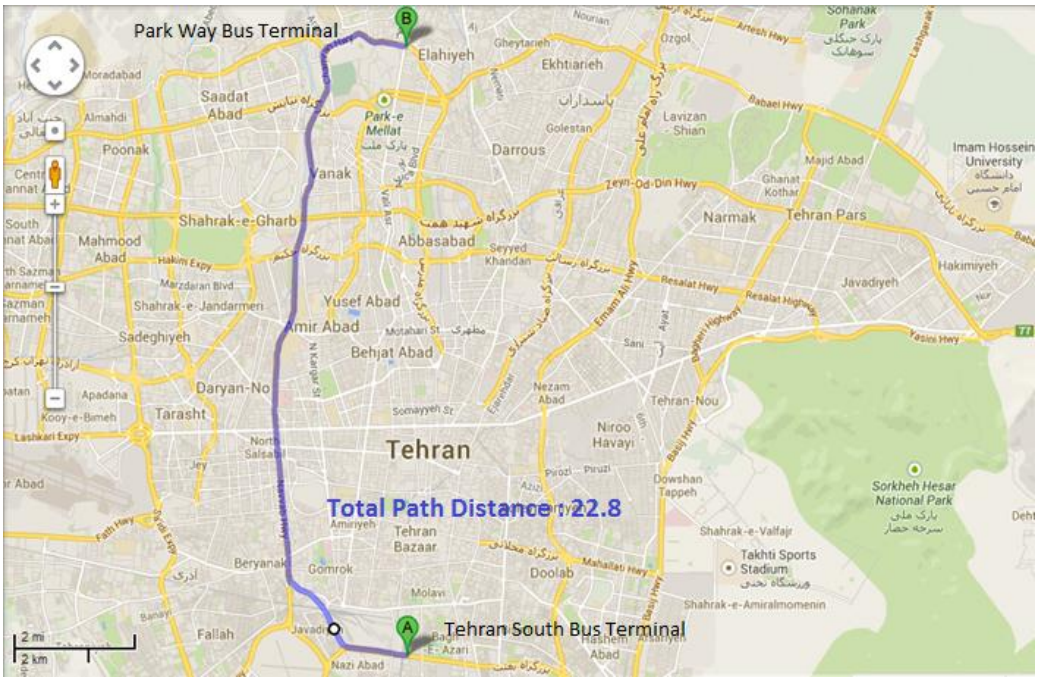
DPFs' Operation Results Overview

Vehicle ID	DPF Producer Company	Operation Status	Operation Status
		Jun/01/2015 - Jun/15/2015	Jun/16/2015 - Jun/30/2015
78514 (line 4)	HJS_01 (Passive system with FBC)	**3**	**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)	**-**	**-**
33572 (line 2)	HJS_03 (Active system with FBC - Electrical Heater)	**2**	**2**
33637 (line 2)	Dinex_02 (Passive system with FBC)	**3**	**5**
85476 (line 10)	HJS_04 (Passive system with FBC)	**1**	**1**

*Notice: Due to **bus electrical problem** and missing data, unreliable conclusion can't be obtained about this DPF operation.

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

Table 1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, 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 company producer	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	1/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	1.58 $[m^{-1}]$
K value – DPF's downstream	0.04 $[m^{-1}]$

Table 2- Maintenance Table

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)	39191 km
Bus mileage over the period	1959 km
Working days over the period	12 days
Stop days	3 days
Data logger working days	12 days
Working hours over the period	160 hours, 34 minutes
Average working hours per day (including stop days)	10 hours, 42 minutes
Bus average speed	12.20 km/hr
Idle speed time to all working time ration	57%
Total bus fuel consumption over the period	1266 lit
Fuel consumption per hour	7.89 lit/hr
Average fuel consumption	0.65 lit/km
Total bus additive consumption over the period	0.54 lit
Average additive consumption	0.276 cc/km
Additive consumption to fuel ration	425 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

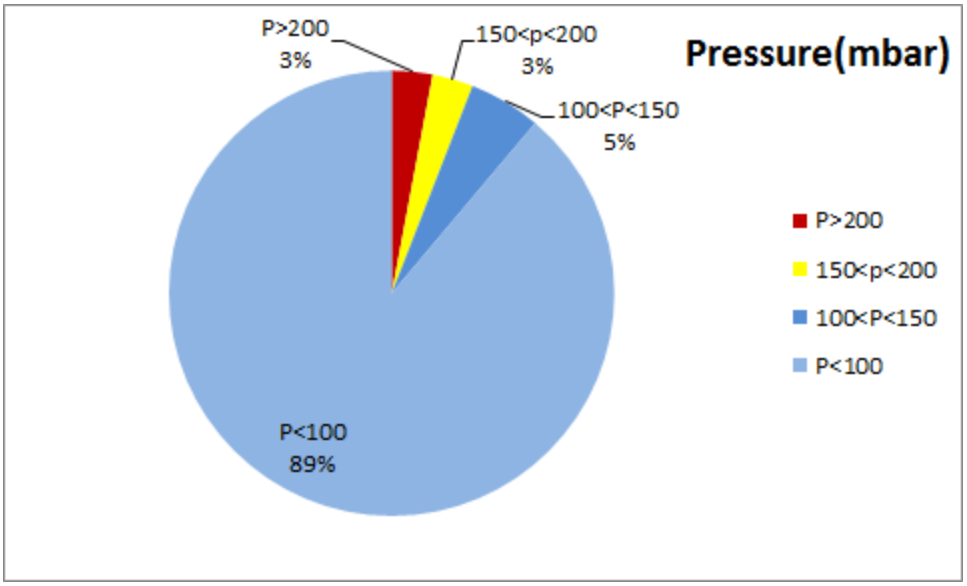


Figure 1- Pressure distribution over the working hours

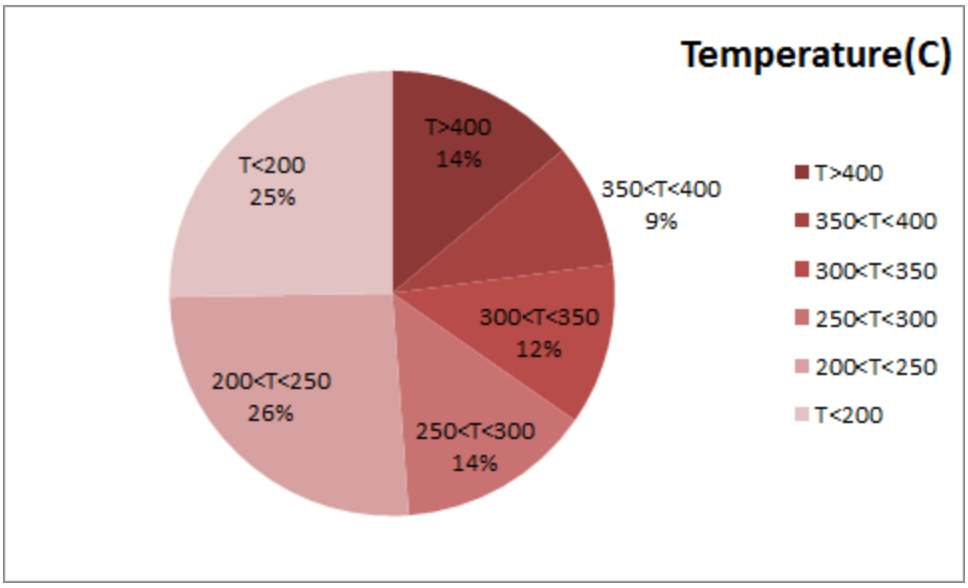


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

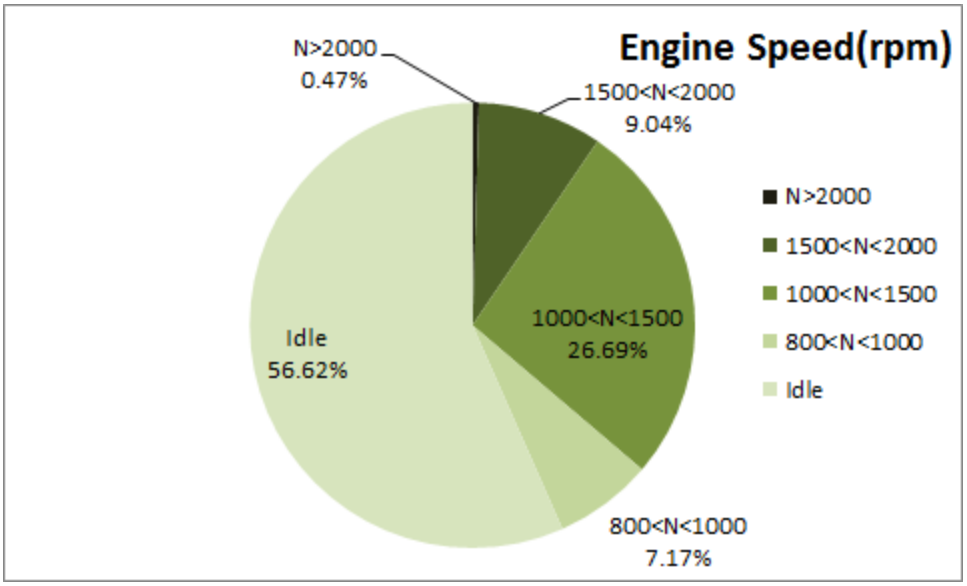


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
274.00	41.86	931

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
335.42	79.20	1277

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
578-50	327-0	2240-80

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

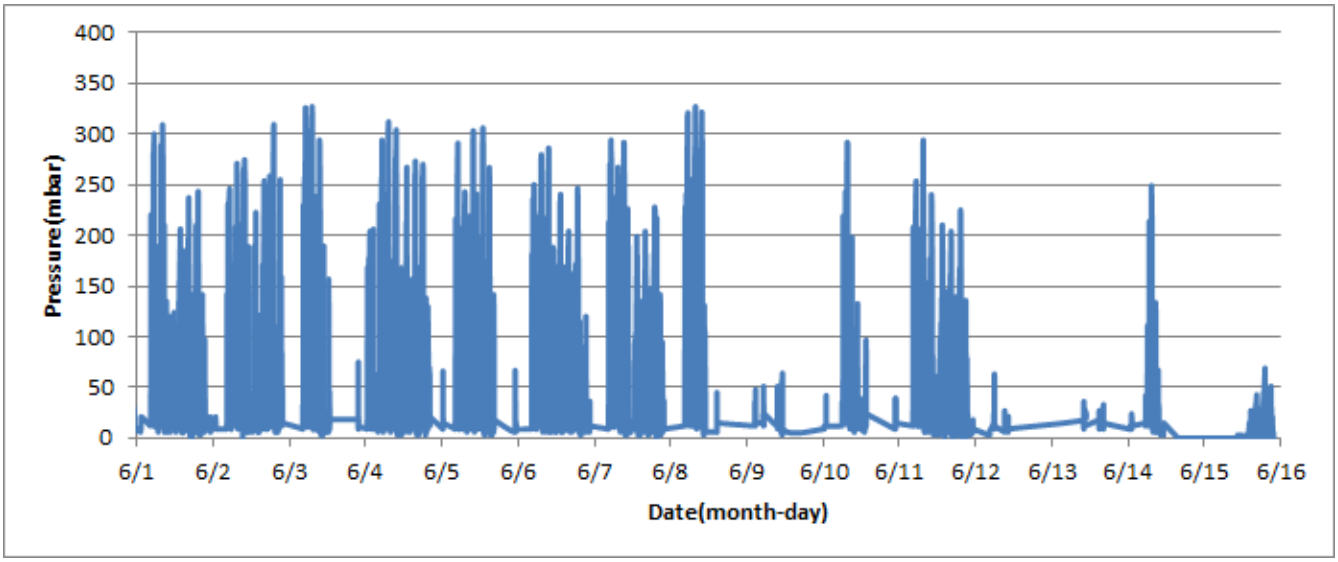


Figure 4- Pressure distribution over the fifteen days

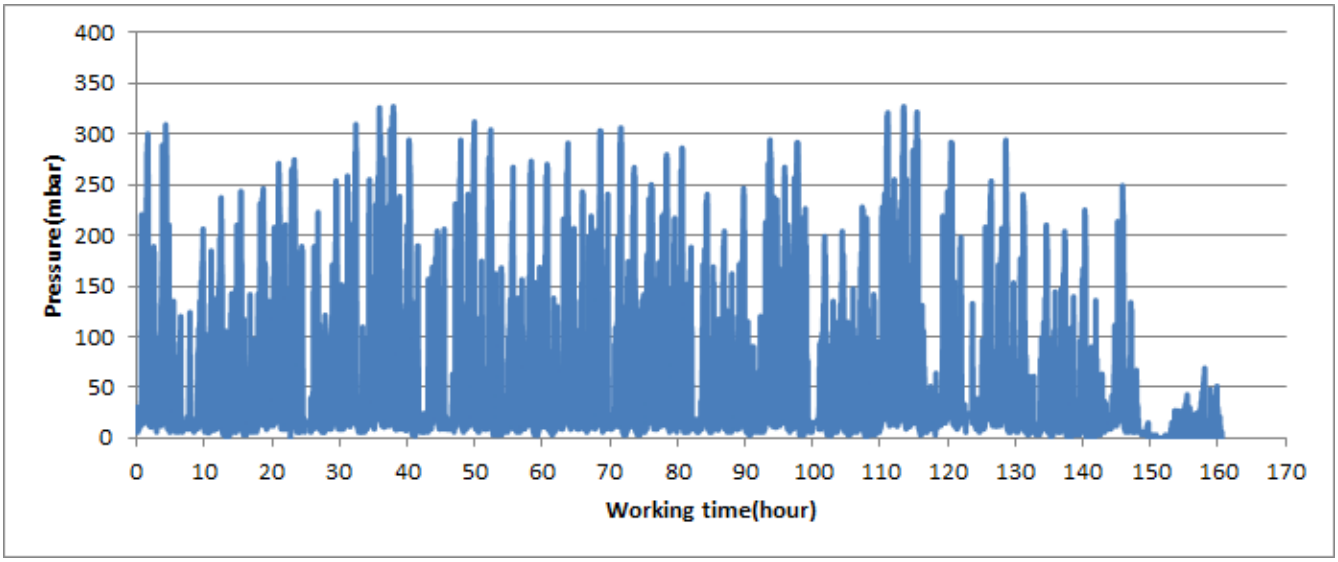


Figure 5- Pressure vs. working hours

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

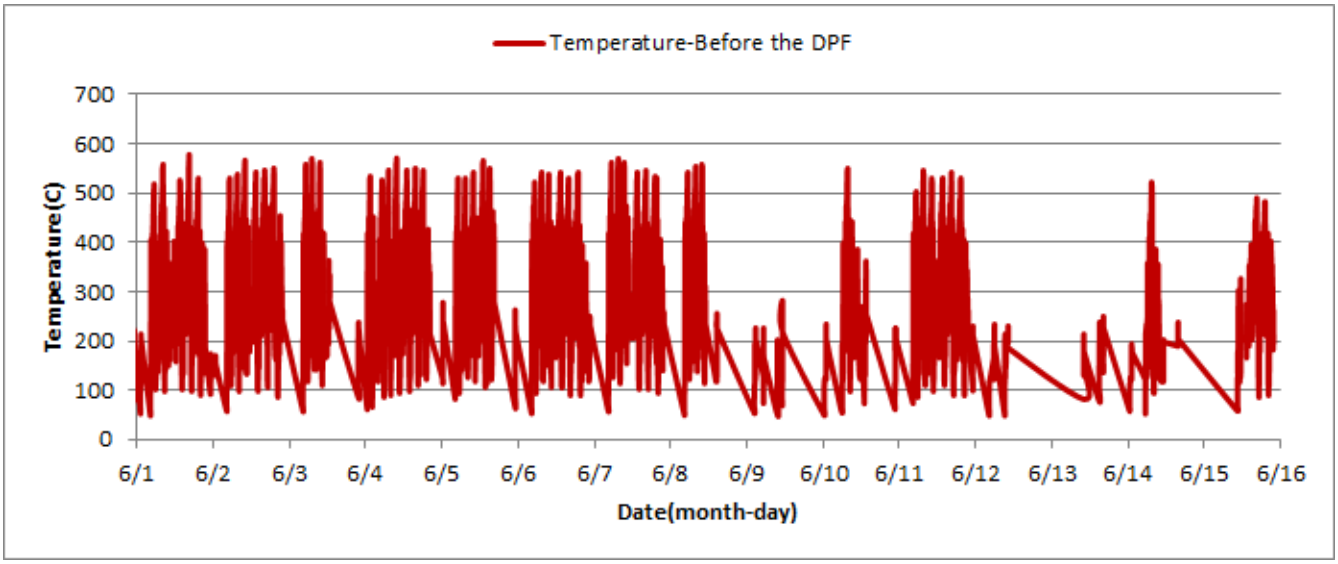


Figure 6- Temperature distribution over the fifteen days

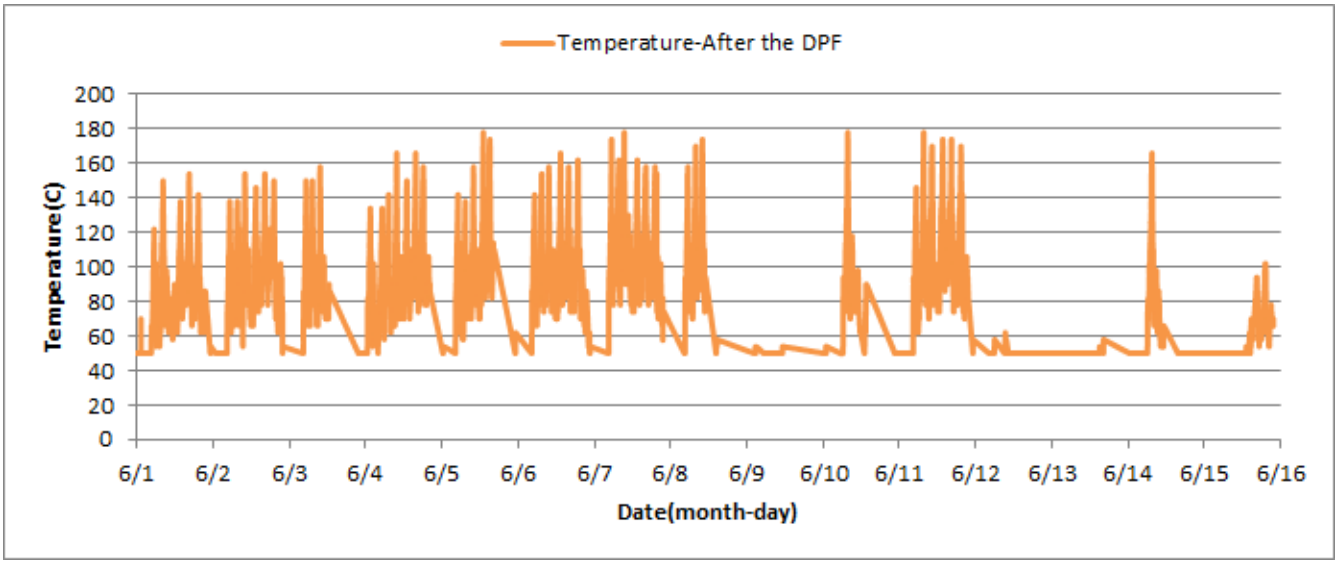


Figure 7- Temperature distribution over the fifteen days

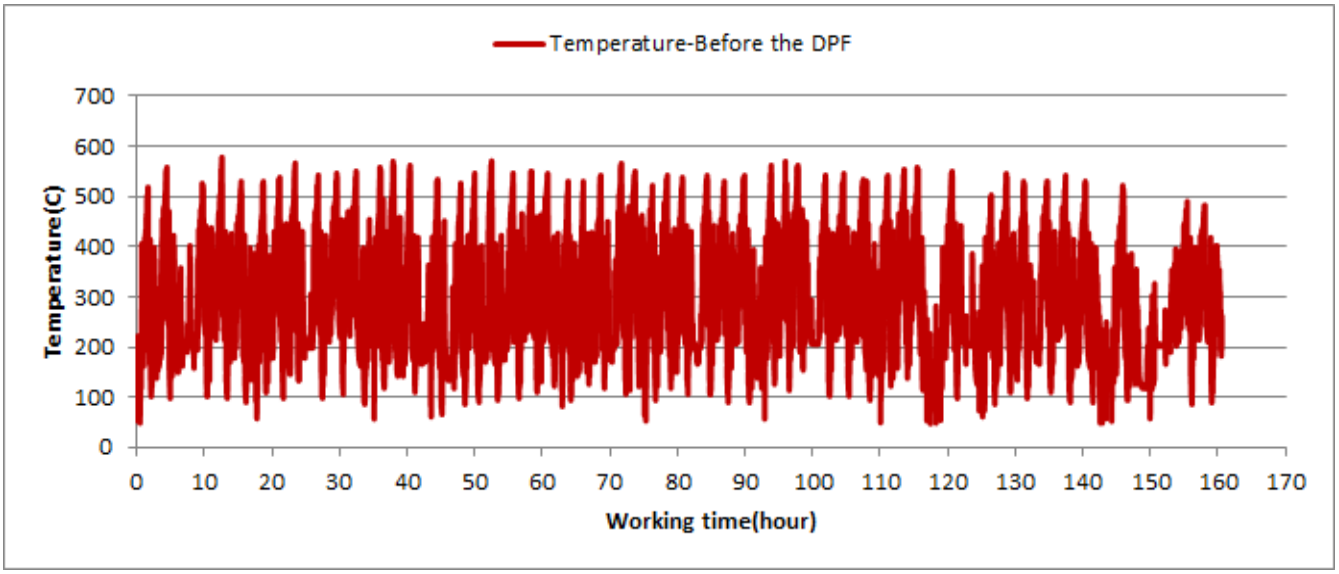


Figure 8- Temperature vs. working hours

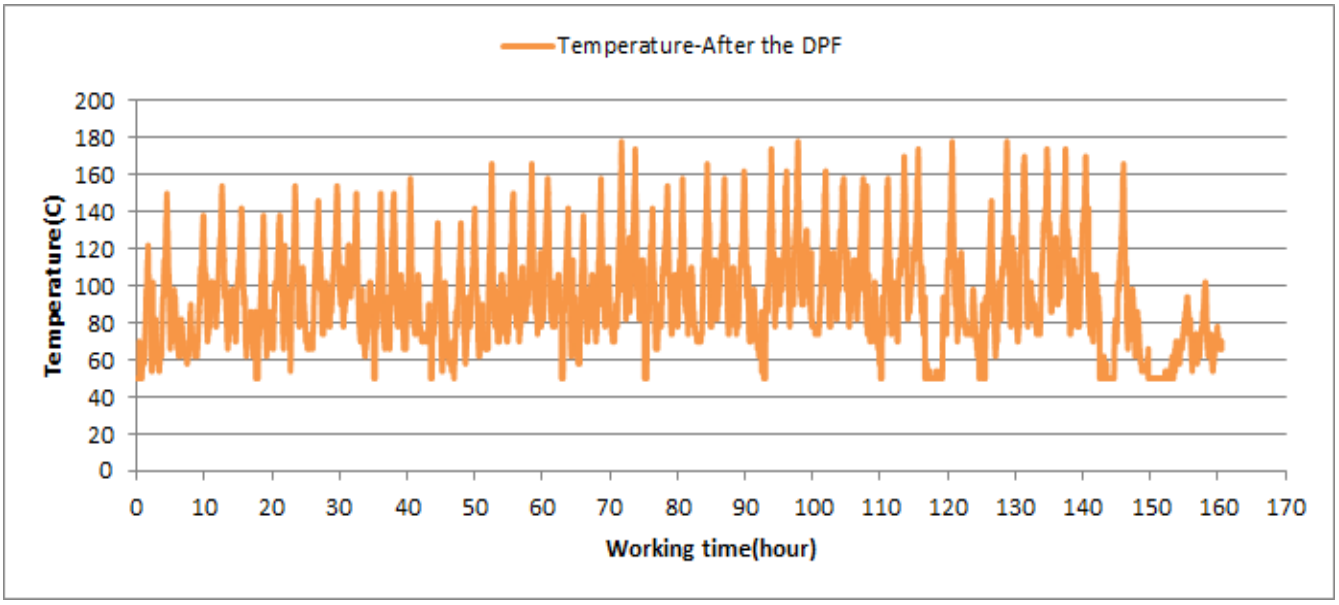


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

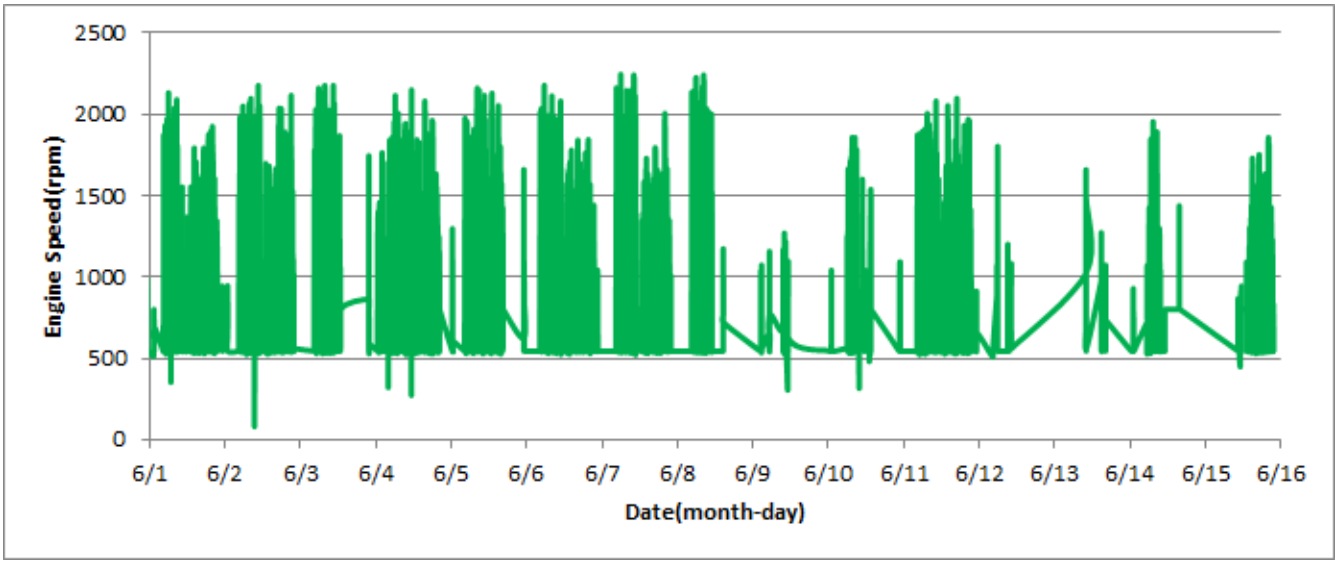


Figure 10- Engine speed distribution over the fifteen days

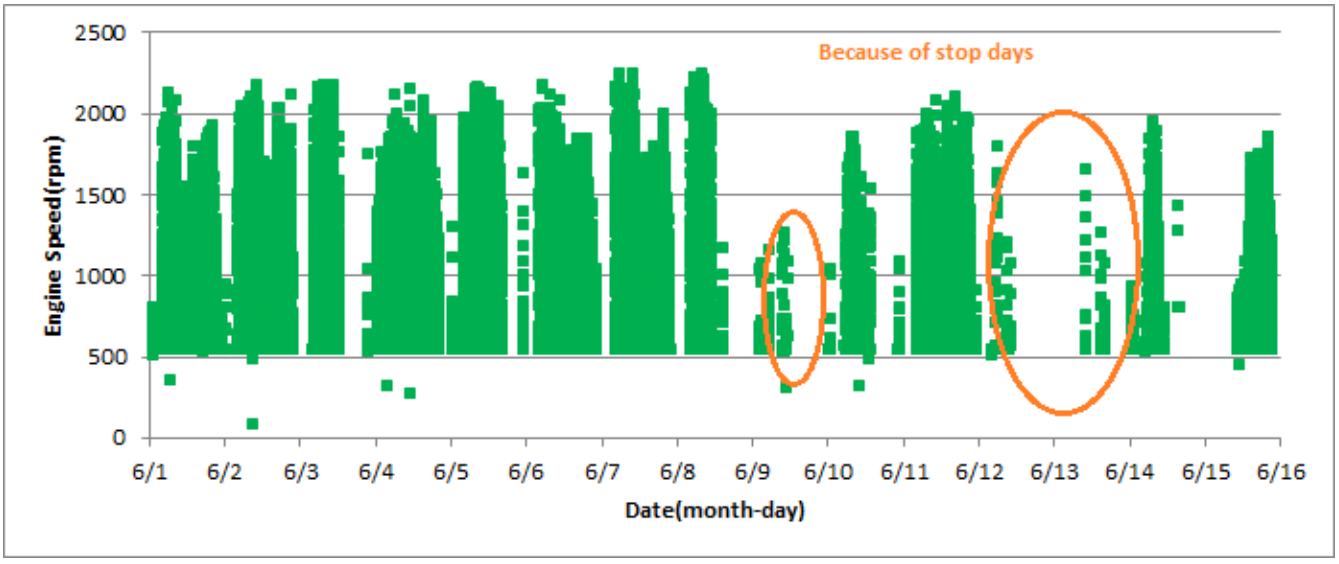


Figure 11- Engine speed diagram for calculating CPK's working days

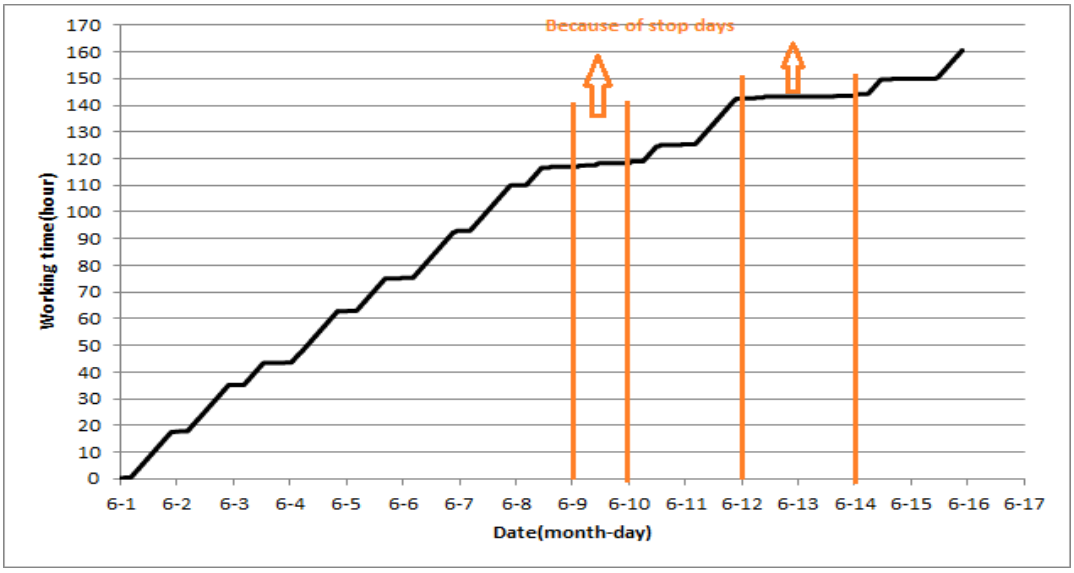


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without CPK's (data logger) data. As depicted in Figure 12, data logger didn't sample three days.

Pressure-Engine Speed diagrams

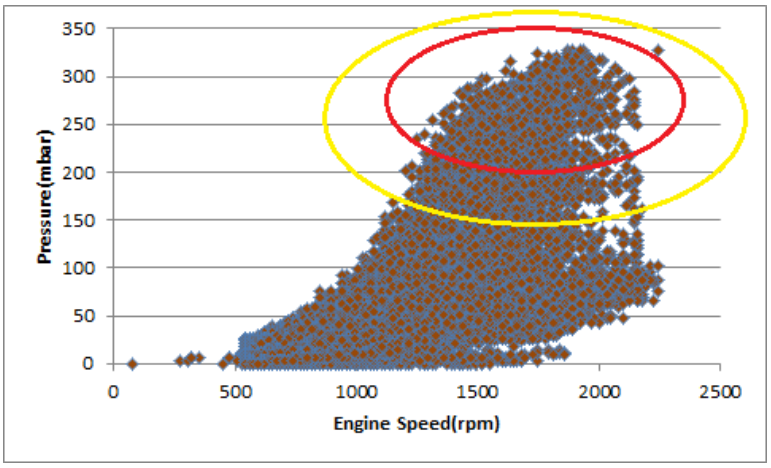


Figure 13- Pressure against engine speed

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

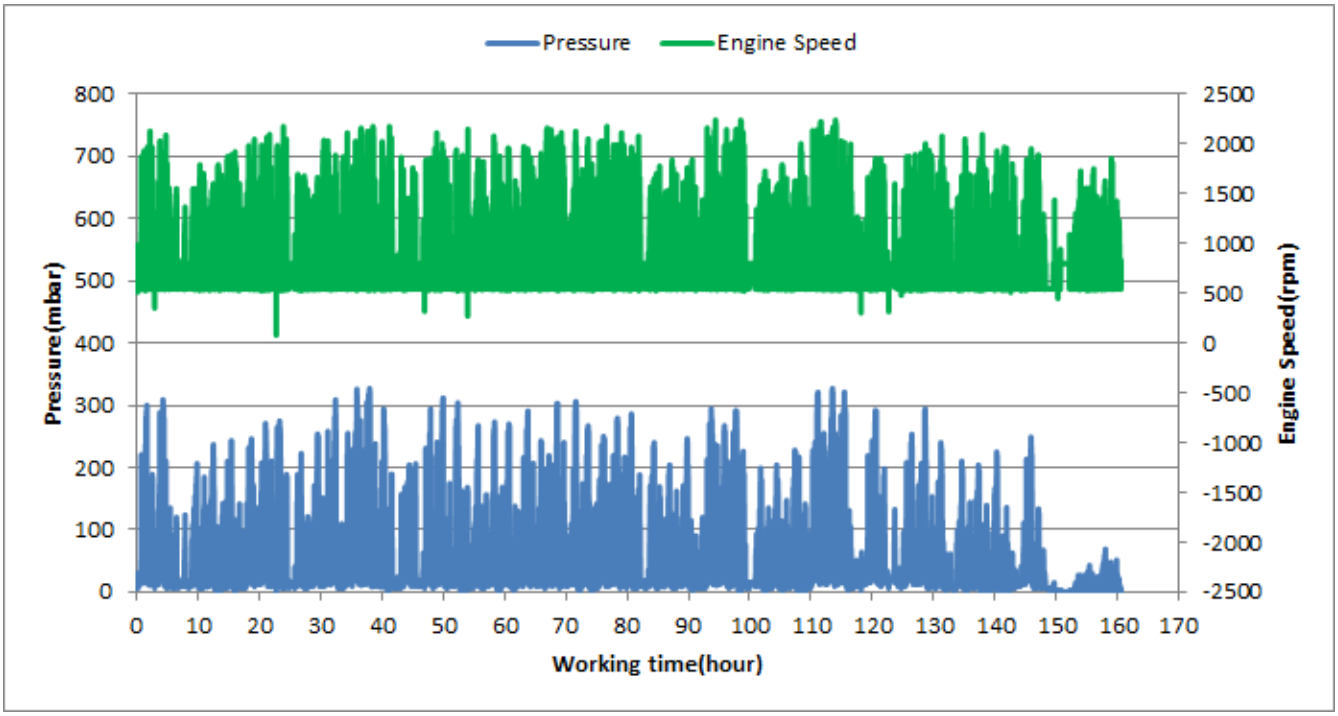


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

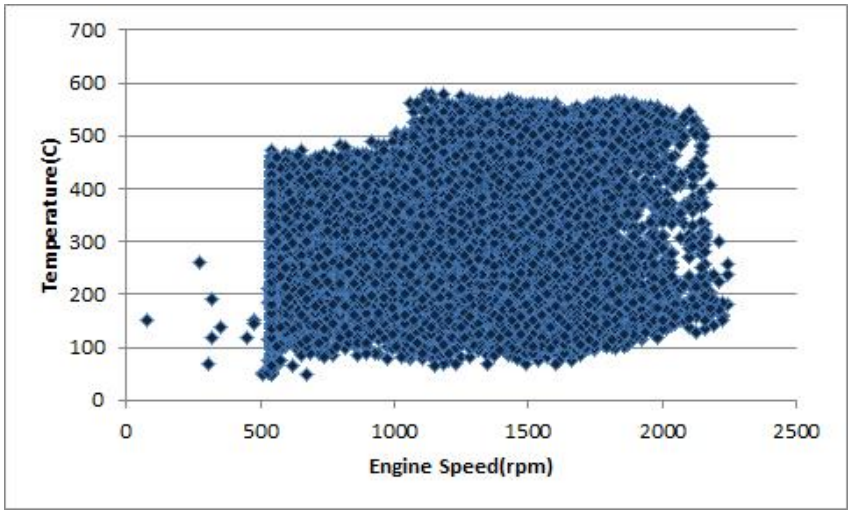


Figure 15- Temperature against engine speed

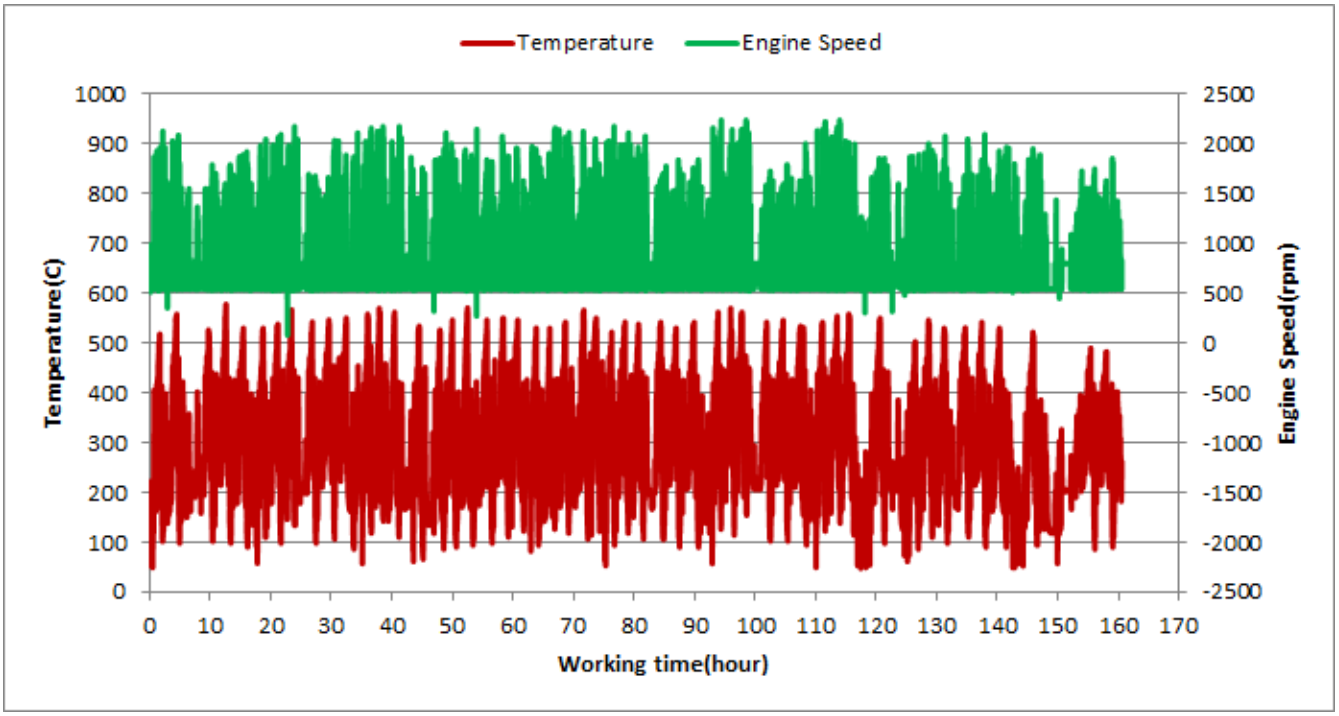


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, 3% of total working time, pressure is above 200 mbar and 6% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 14% of total working time temperature is above 400 °C and 23% above 350°C. 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☐

Notice: DPF core was cleaned on Jun 13th.

Overall Information

Table 1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, 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 company producer	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	16/Jun/2015 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	1.54 $[m^{-1}]$
K value – DPF's downstream	0.04 $[m^{-1}]$

Table 2- Maintenance Table

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)	41700 km
Bus mileage over the period	2509 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	214 hours, 48 minutes
Average working hours per day (including stop days)	11hours, 41 minutes
Bus average speed	11.68 km/hr
Idle speed time to all working time ration	53%
Total bus fuel consumption over the period	1622 lit
Fuel consumption per hour	7.55 lit/hr
Average fuel consumption	0.66 lit/km
Total bus additive consumption over the period	0.68 lit
Average additive consumption	0.273 cc/km
Additive consumption to fuel ration	422 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

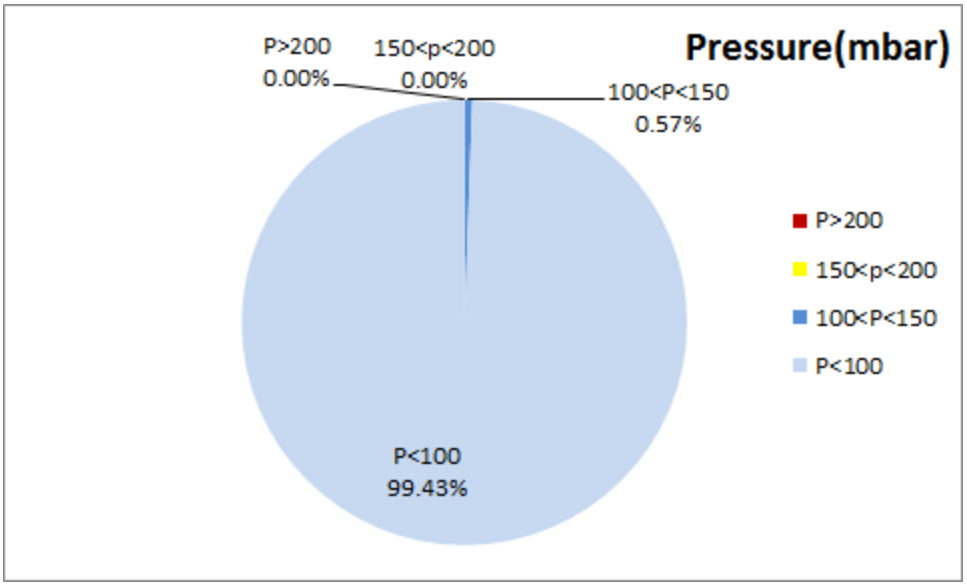


Figure 1- Pressure distribution over the working hours

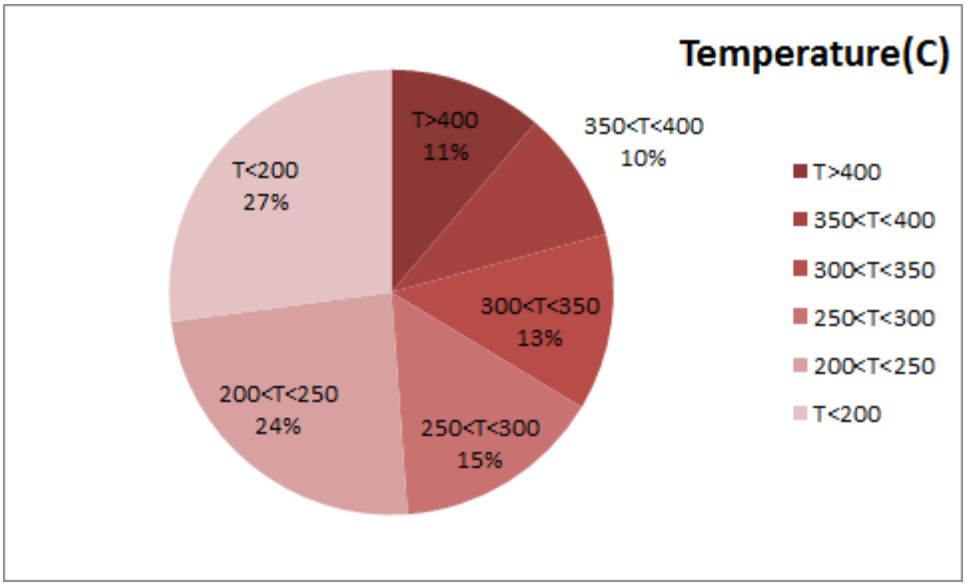


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

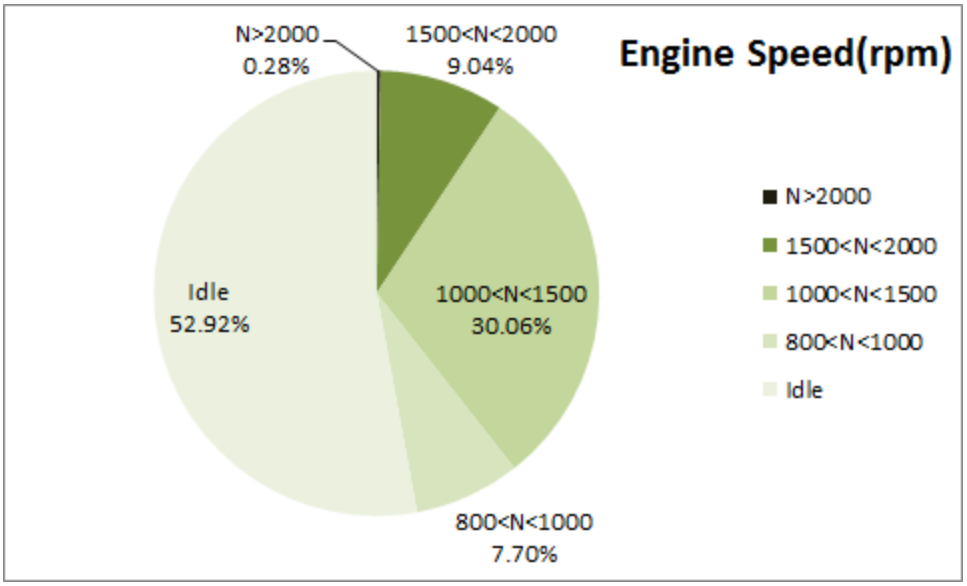


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
266.98	12.49	938

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
314.24	24.73	1261

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
542-50	132-0	2224-304

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

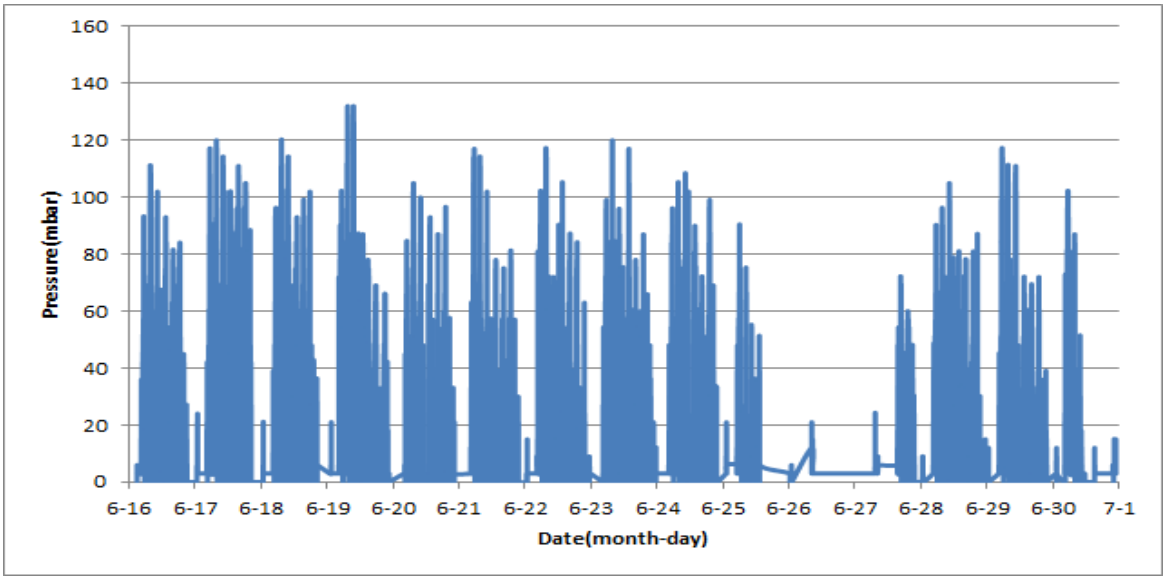


Figure 4- Pressure distribution over the fifteen days

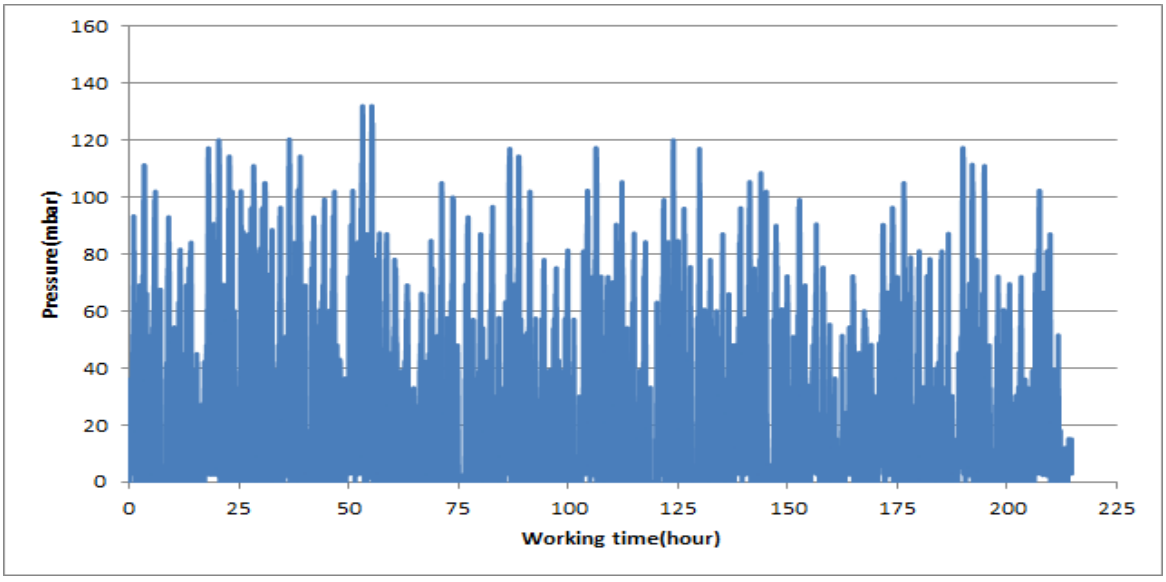


Figure 5- Pressure vs. working hours

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

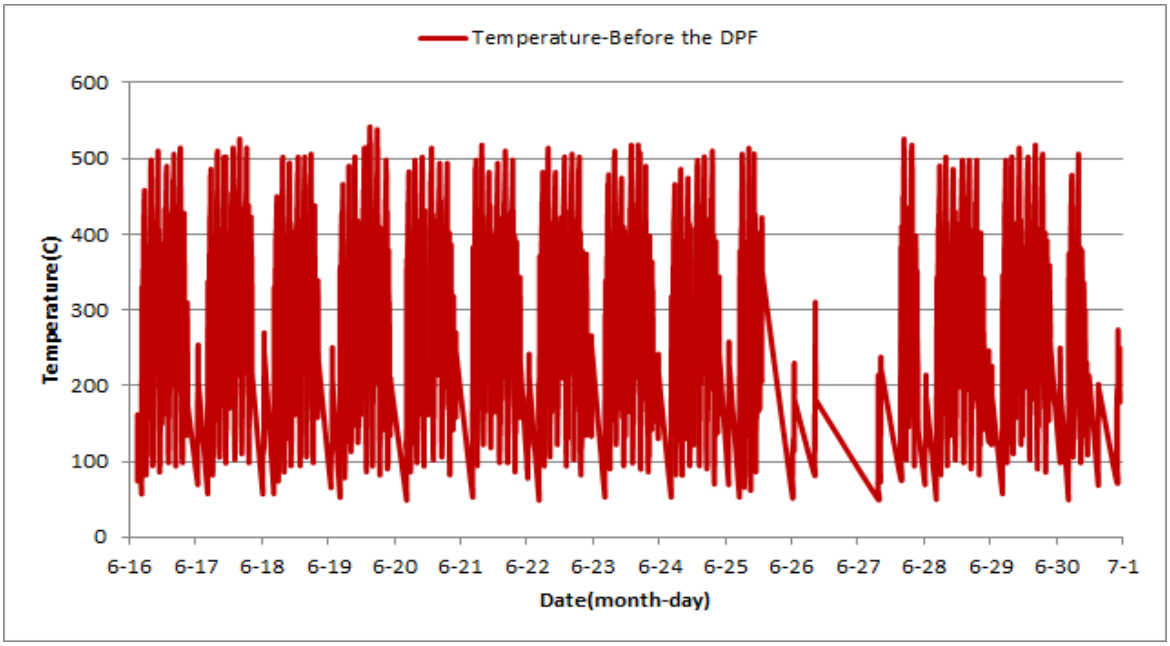


Figure 6- Temperature distribution over the fifteen days

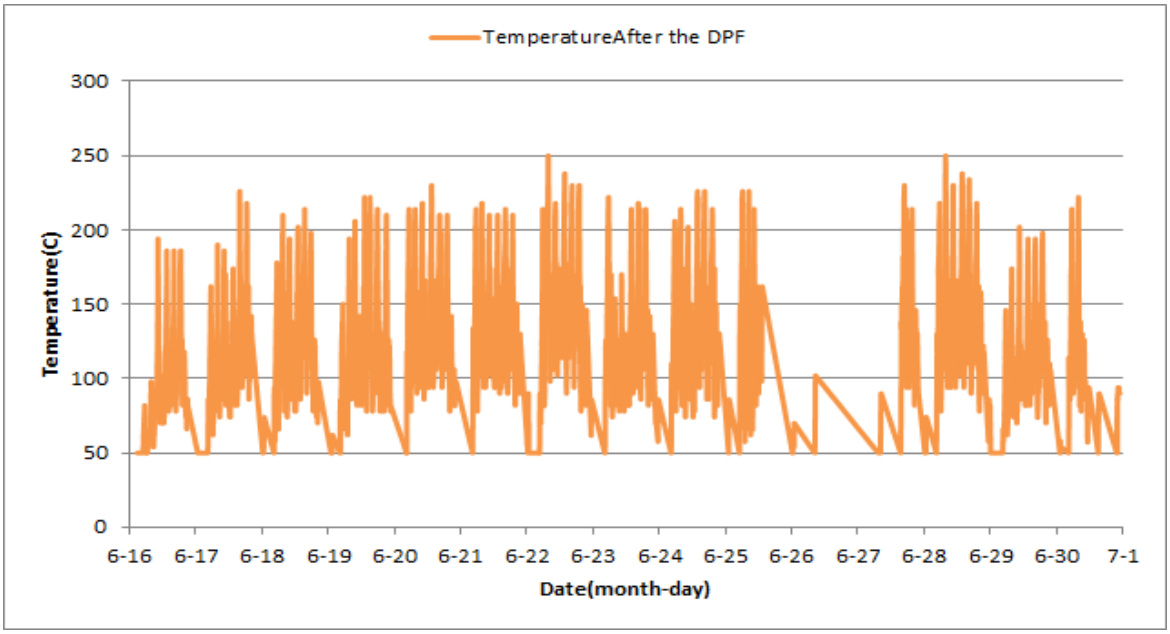


Figure 7- Temperature distribution over the fifteen days

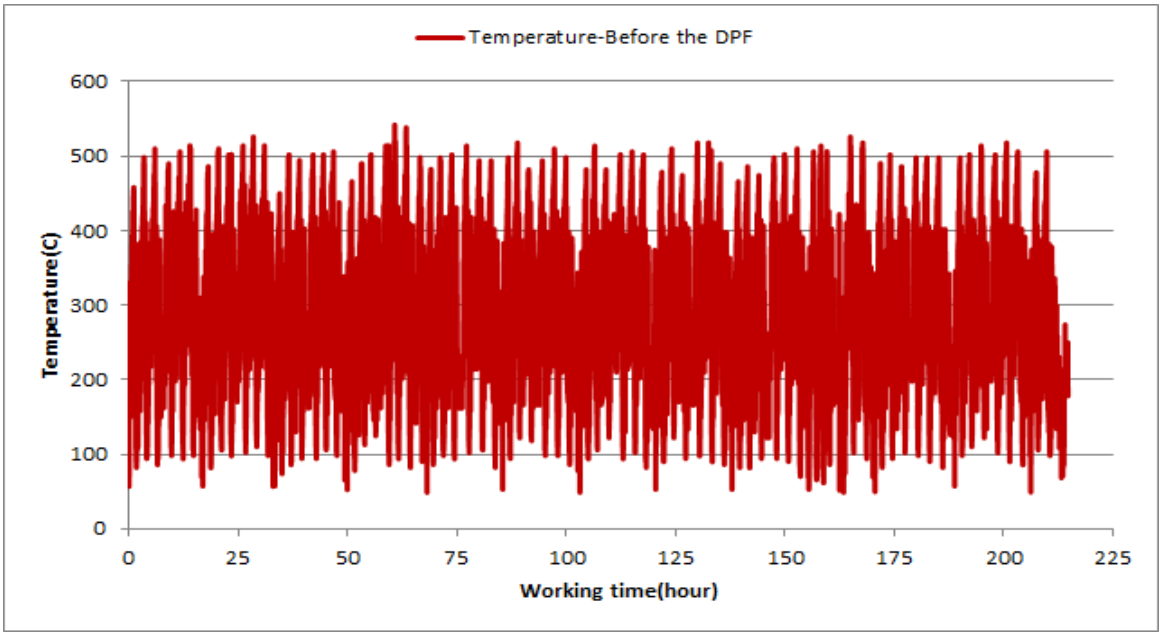


Figure 8- Temperature vs. working hours

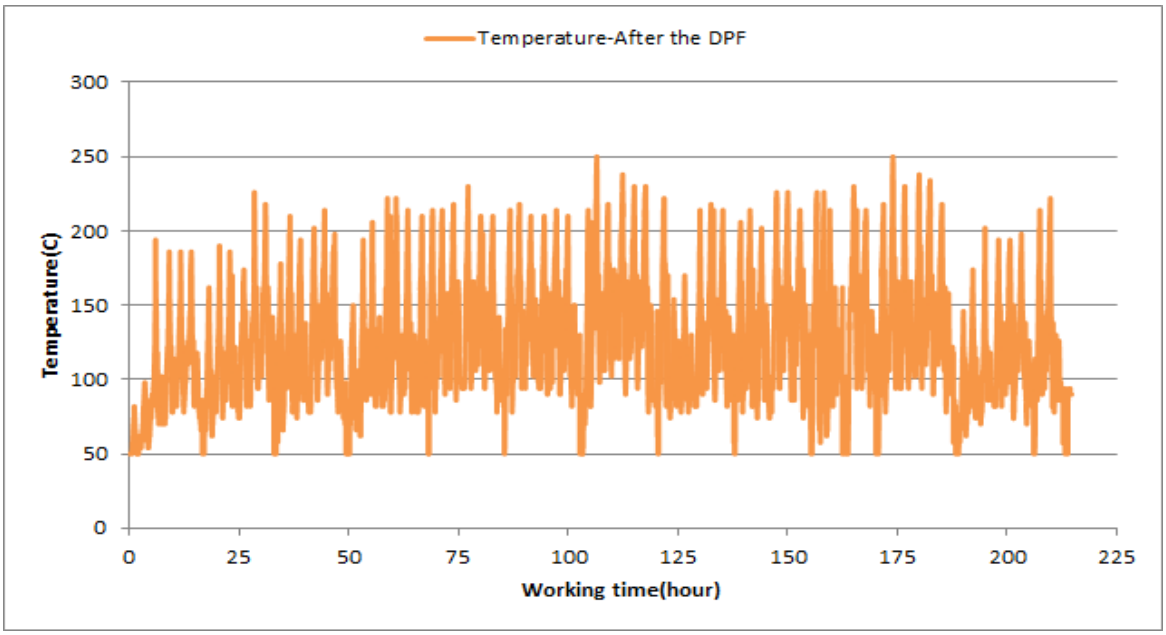


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

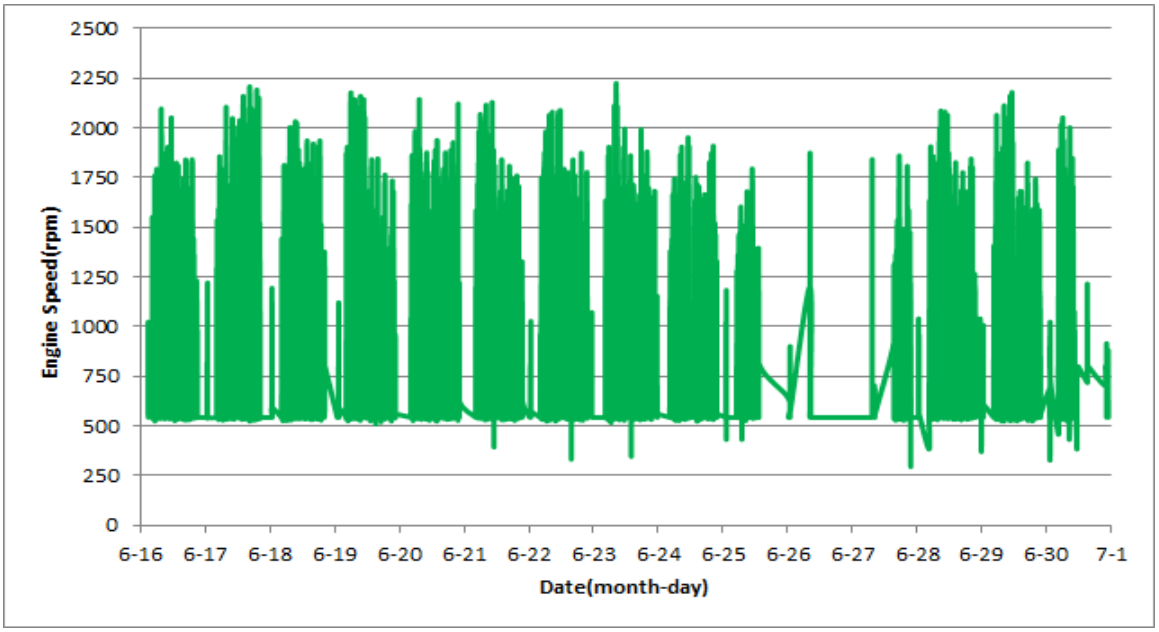


Figure 10- Engine speed distribution over the fifteen days

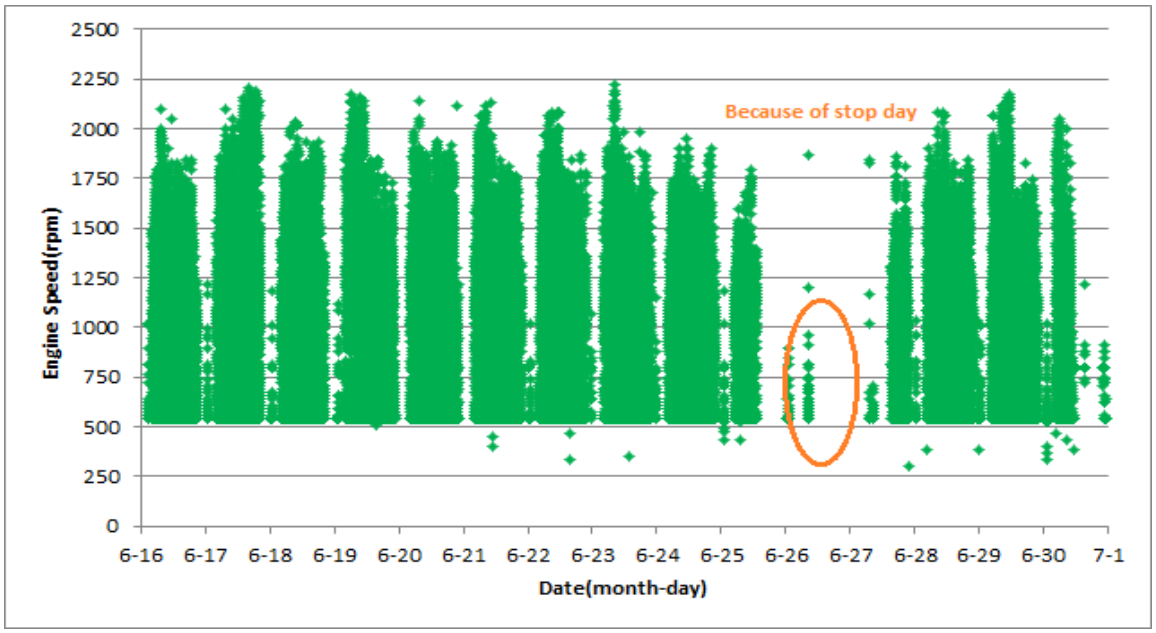


Figure 11- Engine speed diagram for calculating CPK's working days

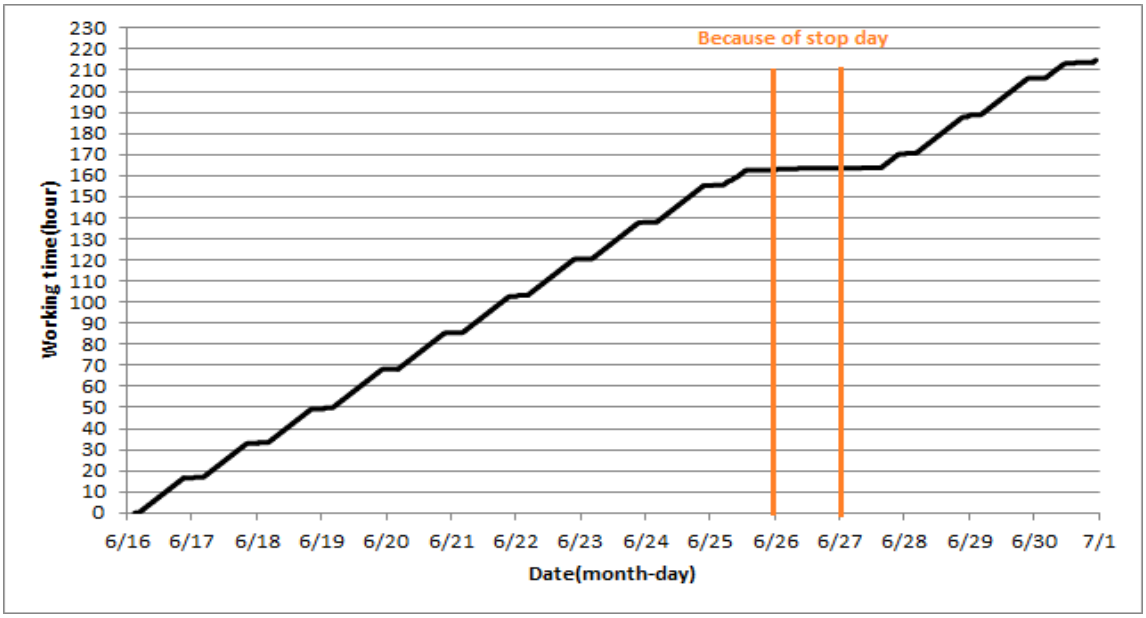


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days CPK's (data logger) data. As depicted in Figure 12, data logger didn't sample on Jun 26th due to stop day.

Pressure-Engine Speed diagrams

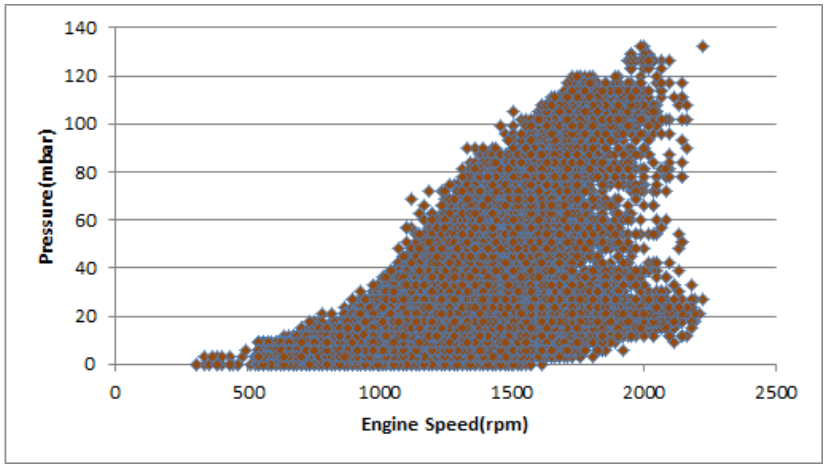


Figure 13- Pressure against engine speed

Notice: Red alarm (pressure>200) and yellow alarm (150<pressure<200) can't be observed in figure 13.

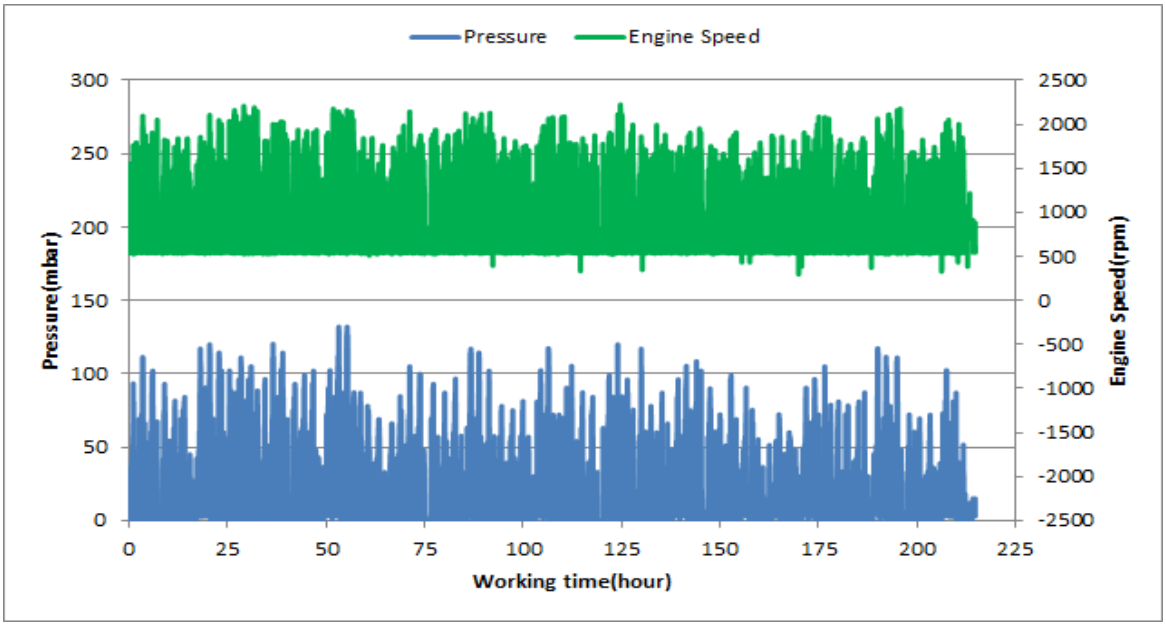


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

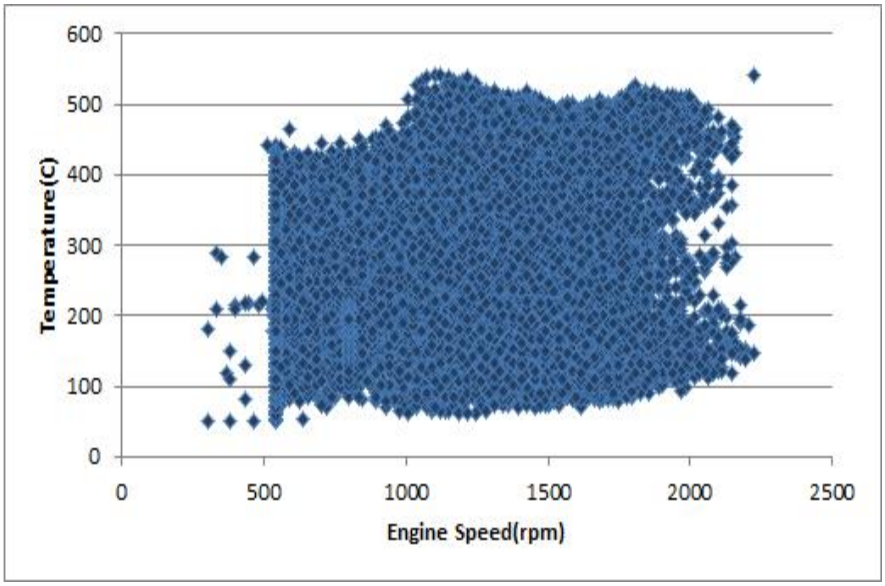


Figure 15- Temperature against engine speed

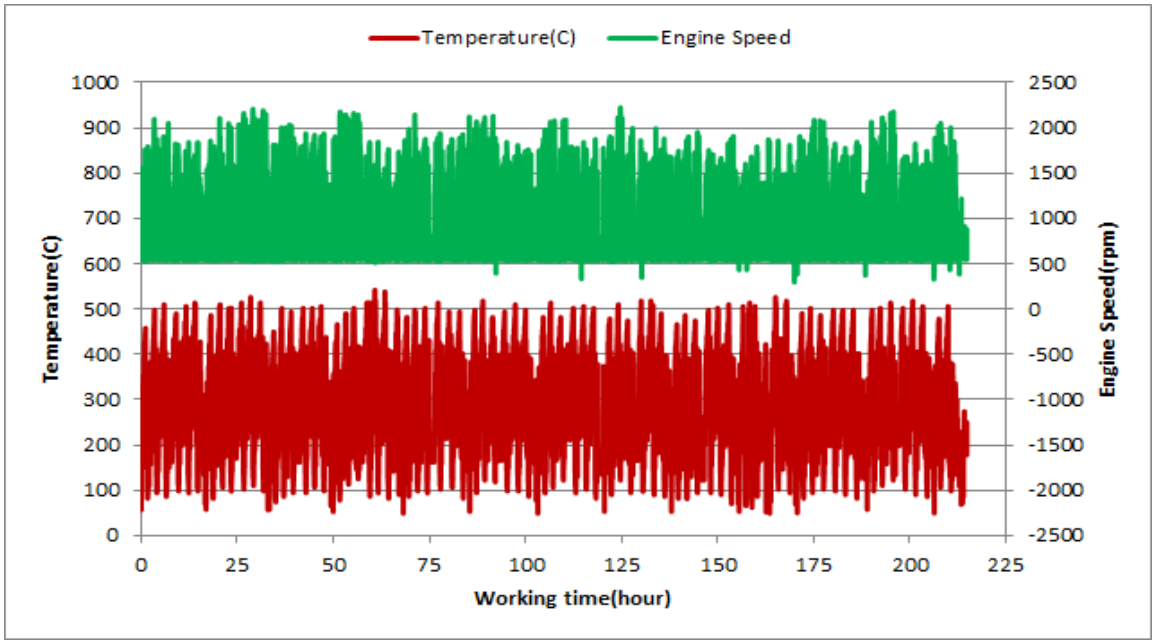


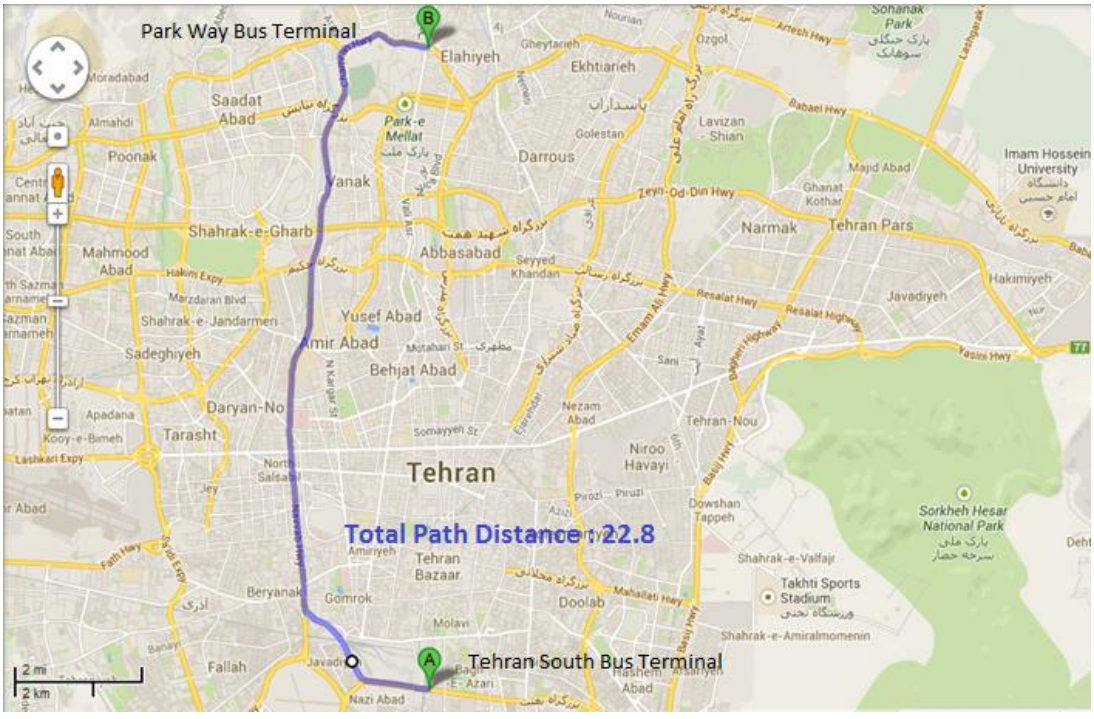
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 150 mbar can't be seen. This excellent operation was result of filter core cleaning that was done on Jun 13th.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 11% of total working time temperature is above 400 °C and 21% above 350°C. This high temperature distribution is one of the important factors for filter excellent operation during the period.

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

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



Overall Information

Table 1- 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	Tehran South Bus Terminal - Park Way Bus 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	1/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	1.03 $[m^{-1}]$
K value – DPF's downstream	0.02 $[m^{-1}]$

Table 2- Maintenance Table

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)	19344 km
Bus mileage over the period	2555 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	189 hours, 47 minutes
Average working hours per a day (including stop days)	12 hours, 59 ,minutes
Bus average speed	13.46 km/hr
Idle speed time to all working time ration	58%
Total bus fuel consumption over the period	1612 lit
Fuel consumption per hour	8.50 lit/hr
Average fuel consumption	0.63 lit/km
Total bus additive consumption over the period	0.733 lit
Average additive consumption	0.287 cc/km
Additive consumption to fuel ration	455 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

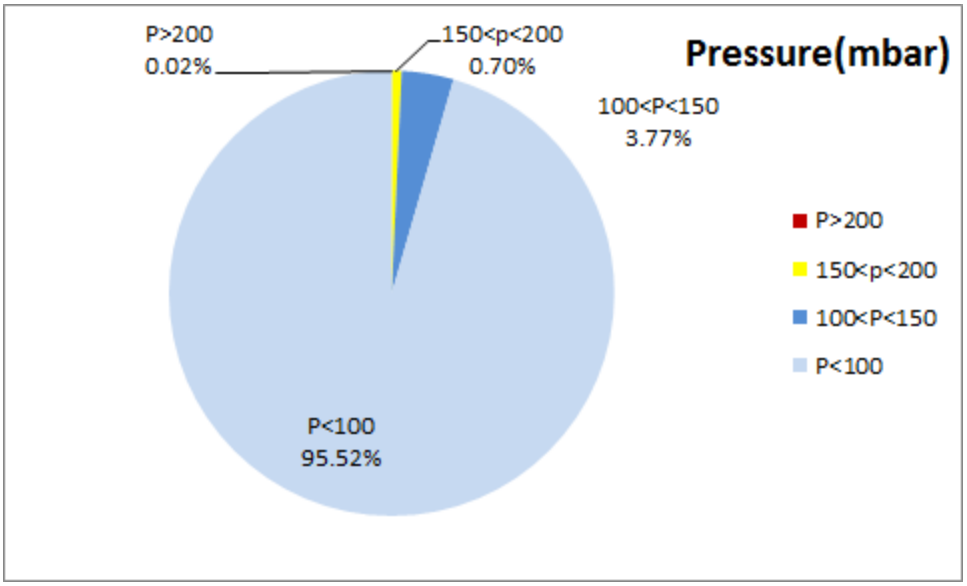


Figure 1- Pressure distribution over the working hours

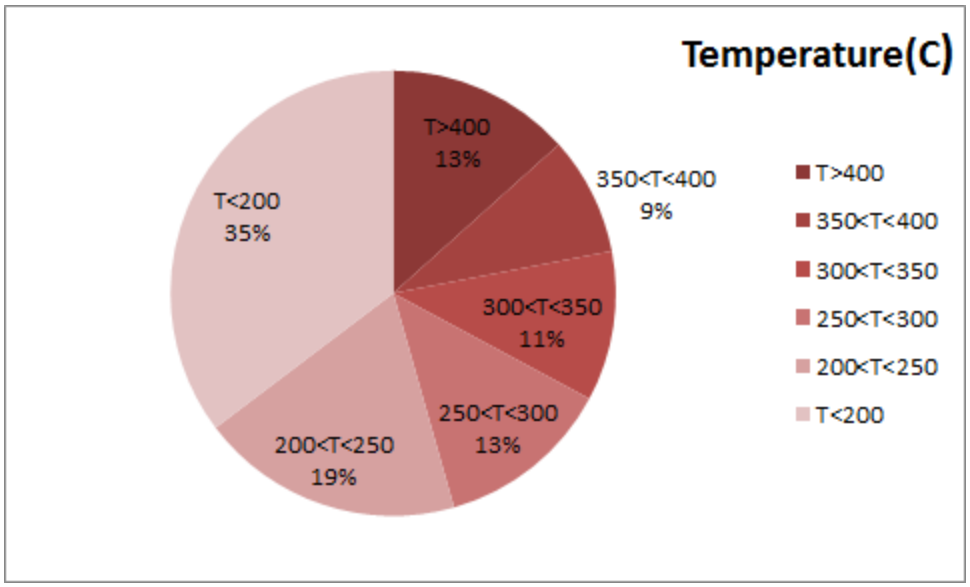


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

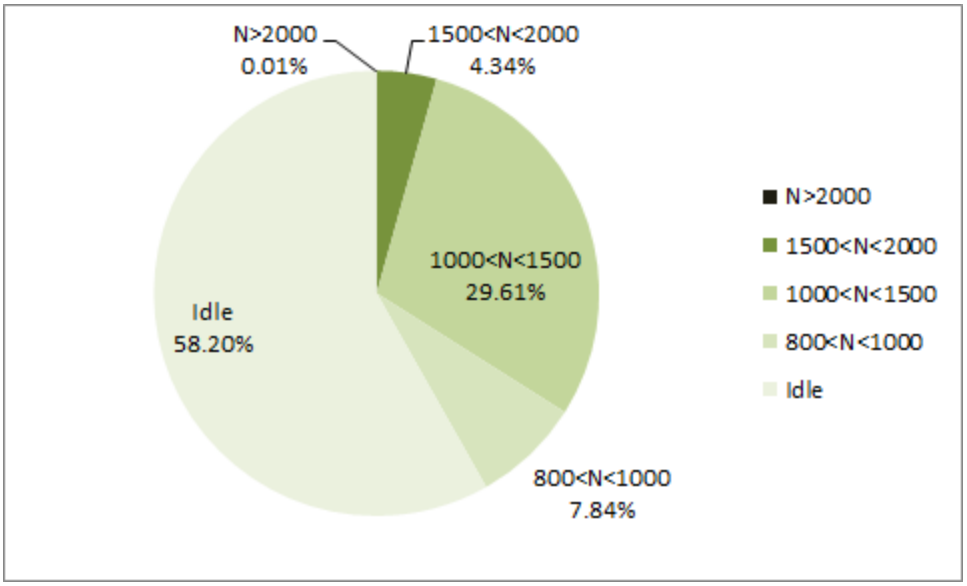


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
263.48	21.47	833

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
332.90	46.19	1206

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
594-50	222-0	2112-256

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

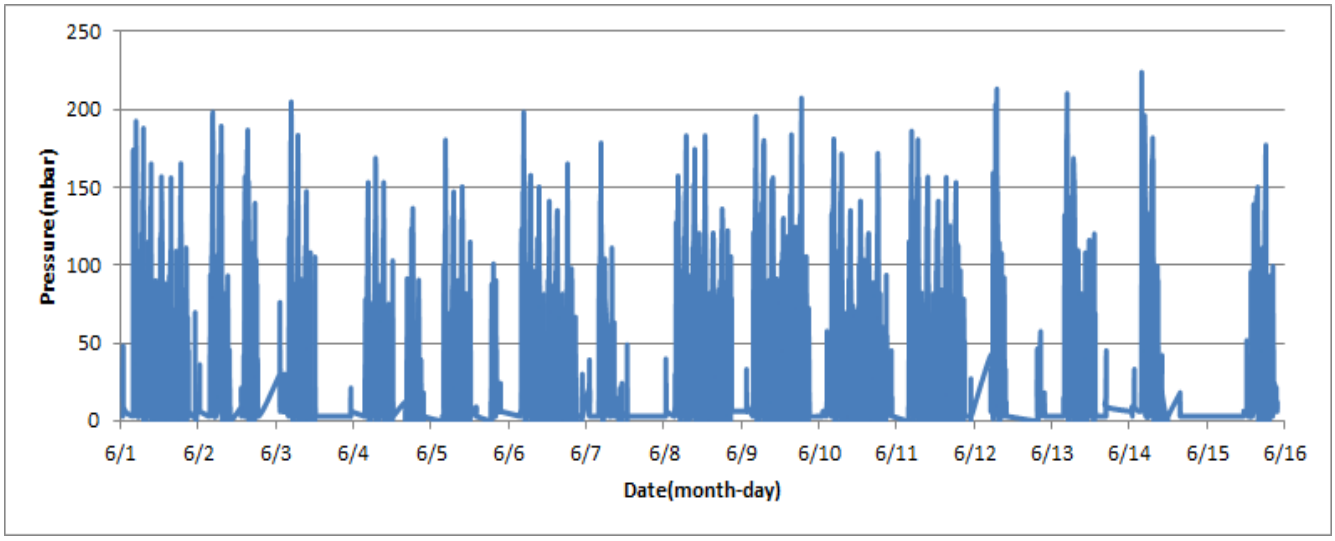


Figure 4- Pressure distribution over the fifteen days

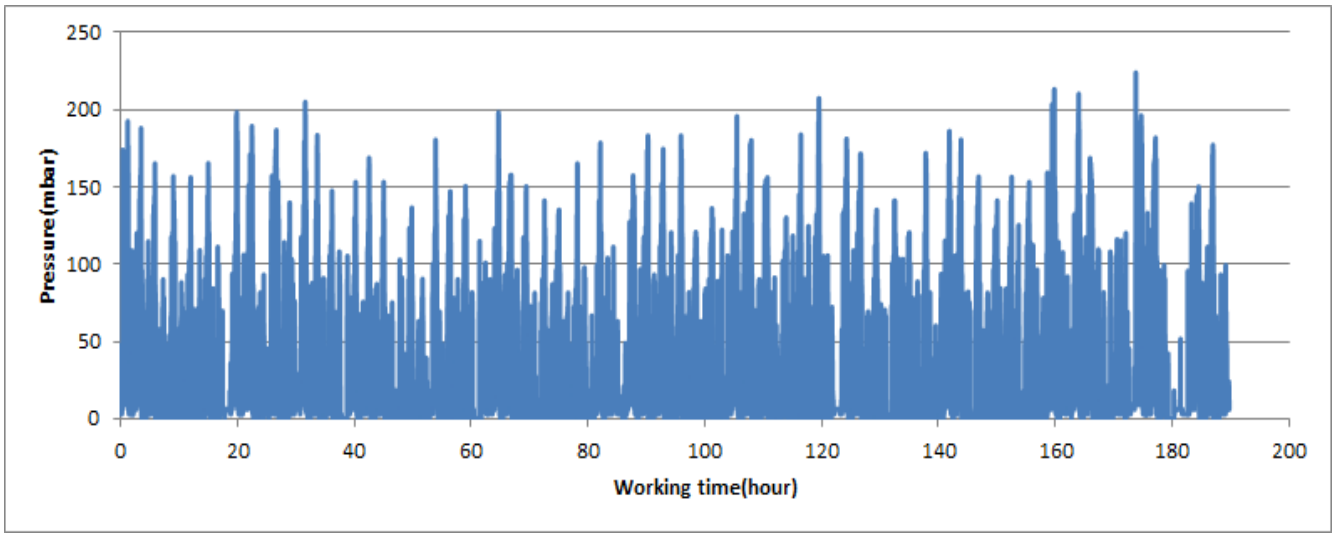


Figure 5- Pressure vs. working hours

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

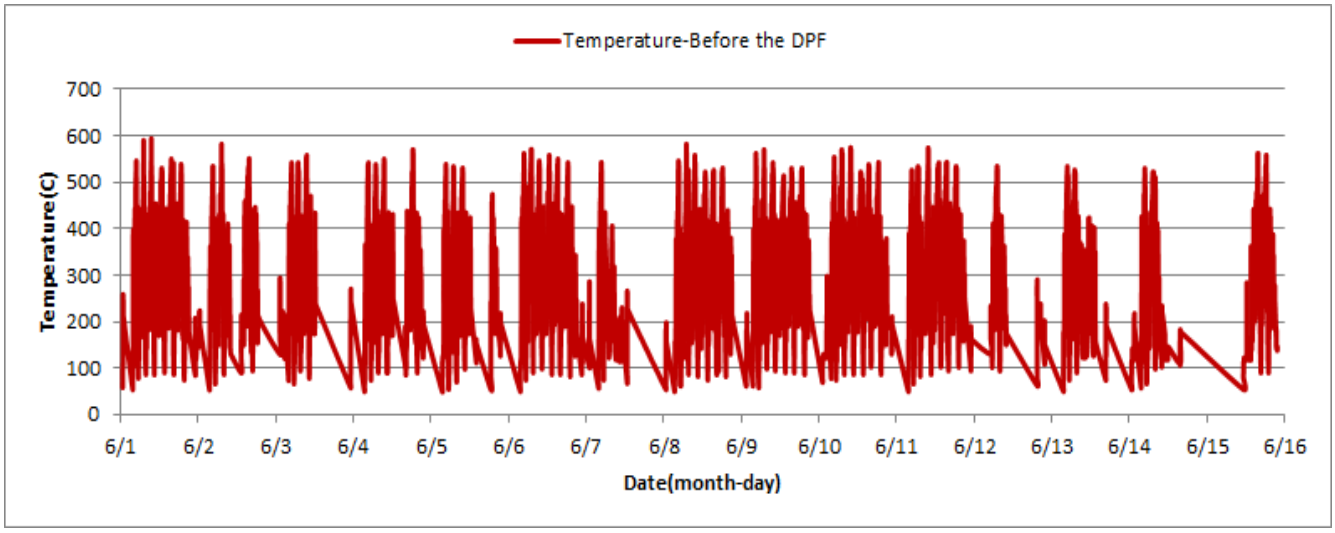


Figure 6- Temperature distribution over the fifteen days

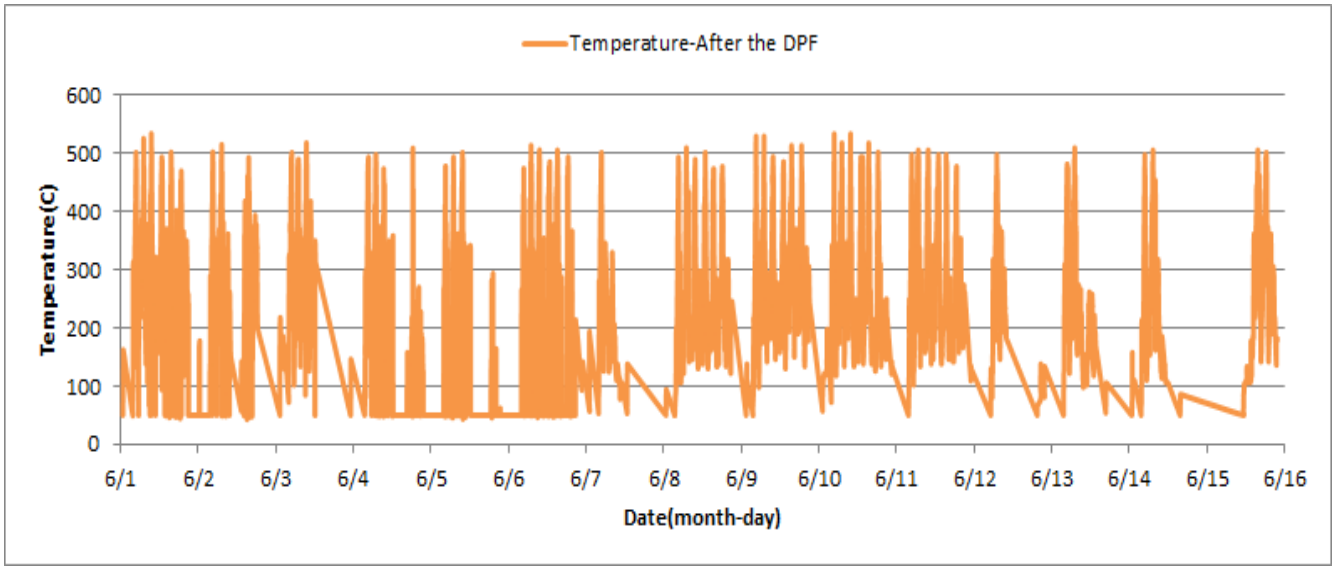


Figure 7- Temperature distribution over the fifteen days

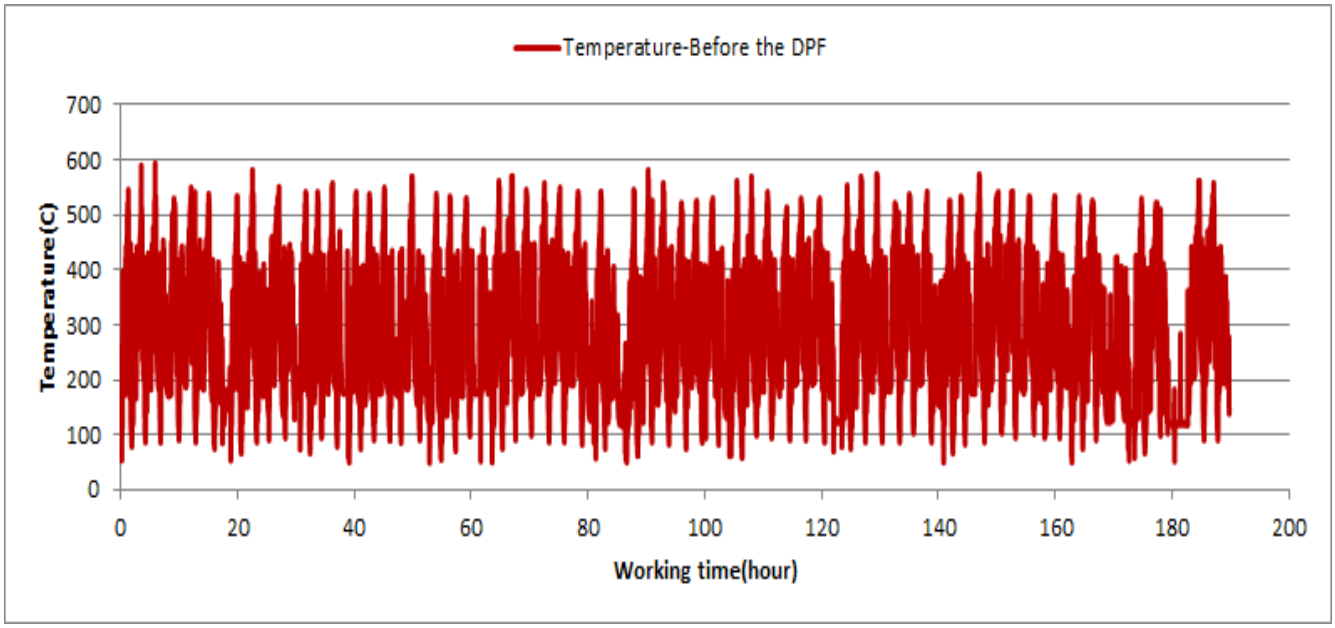


Figure 8- Temperature vs. working hours

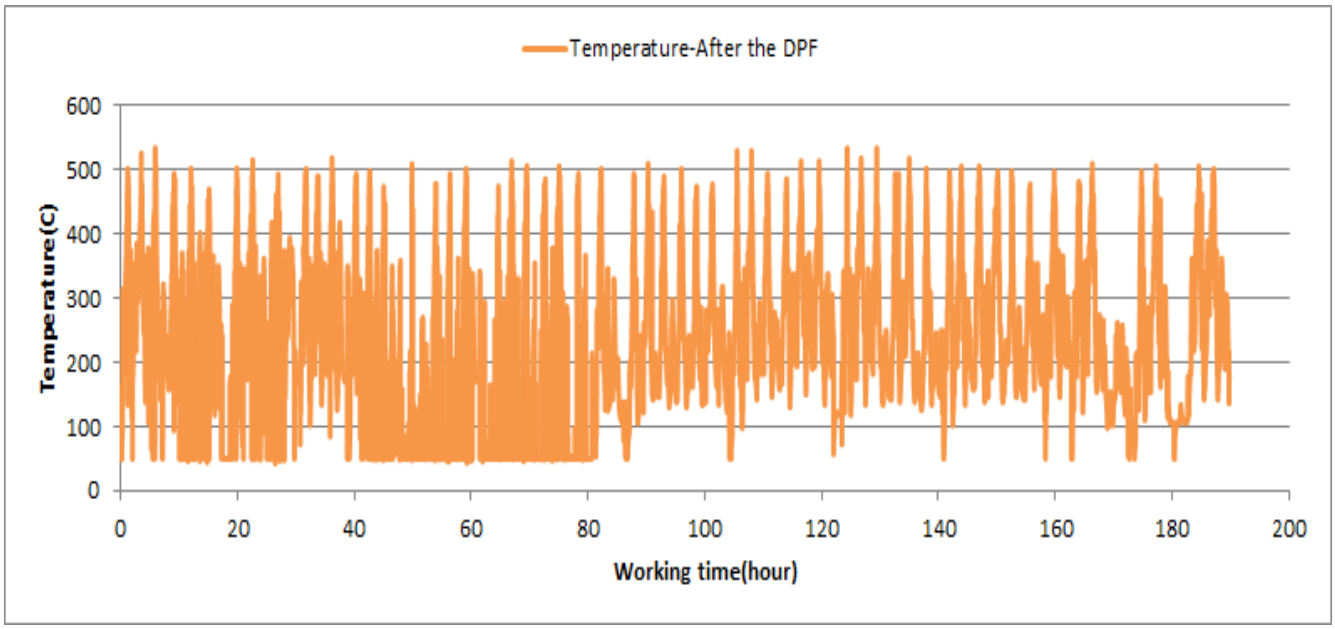


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

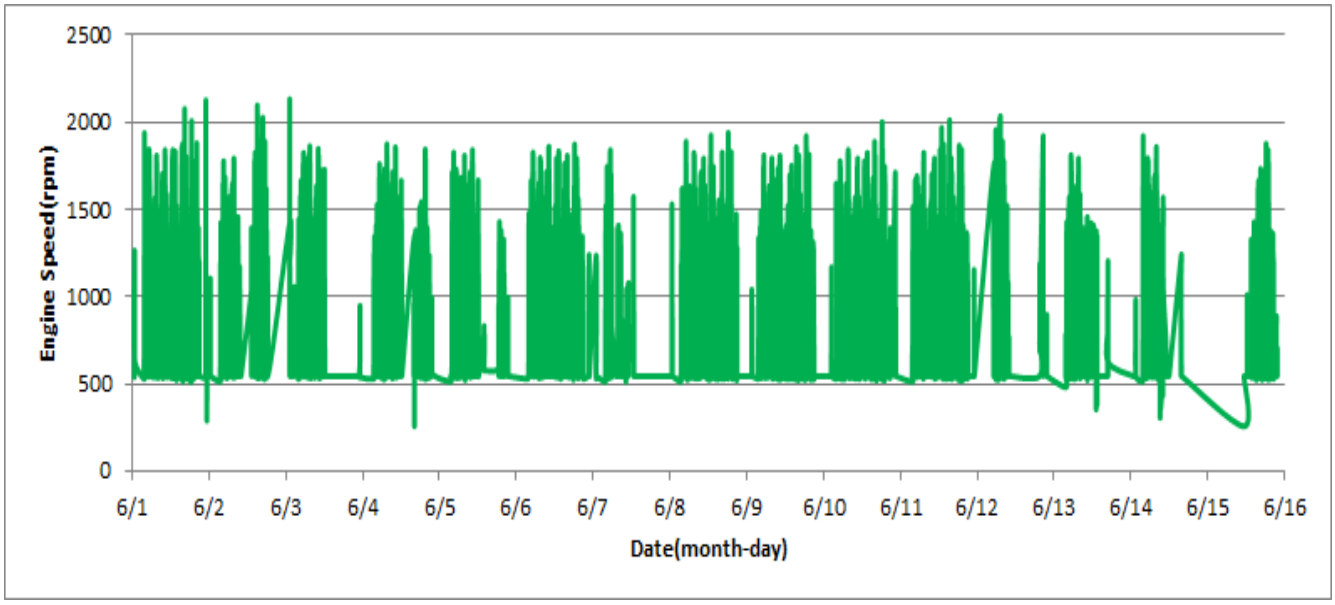


Figure 10- Engine speed distribution over the fifteen days

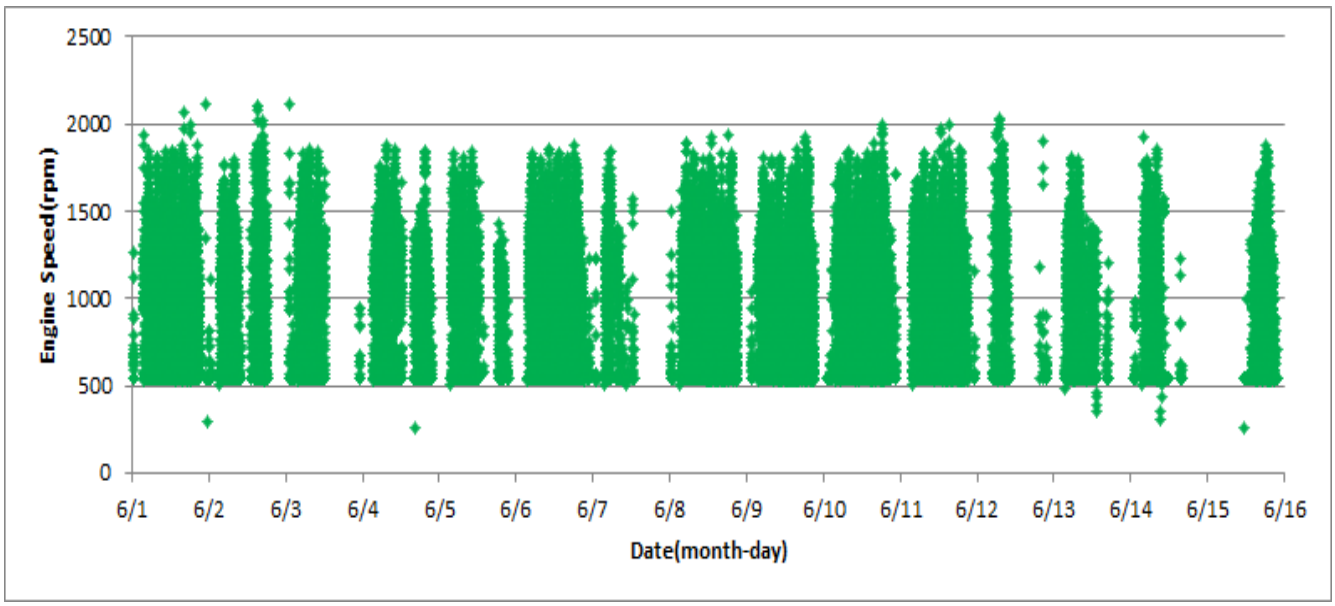


Figure 11- Engine speed diagram for calculating CPK's working days

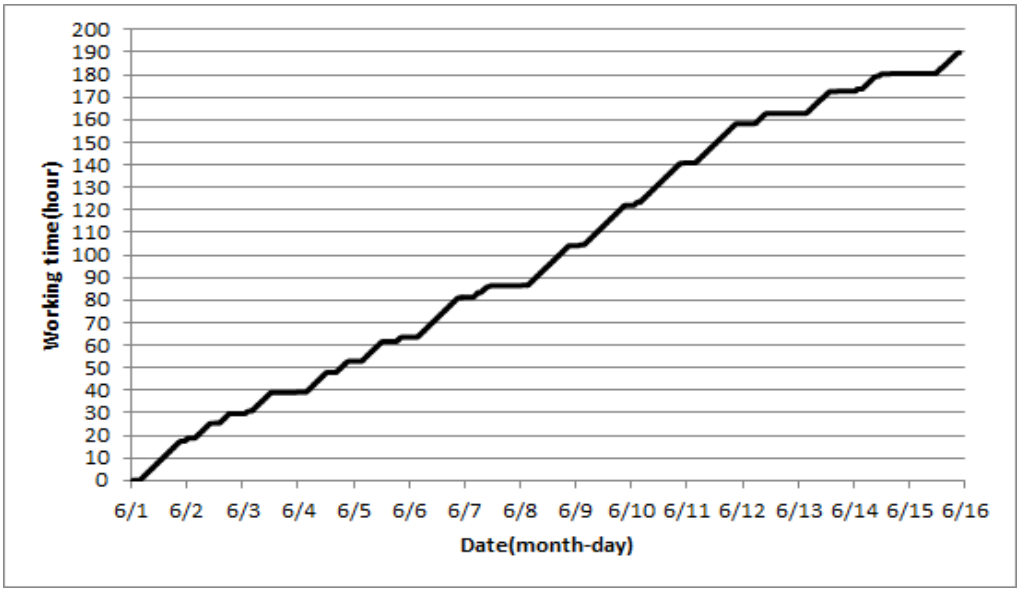


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

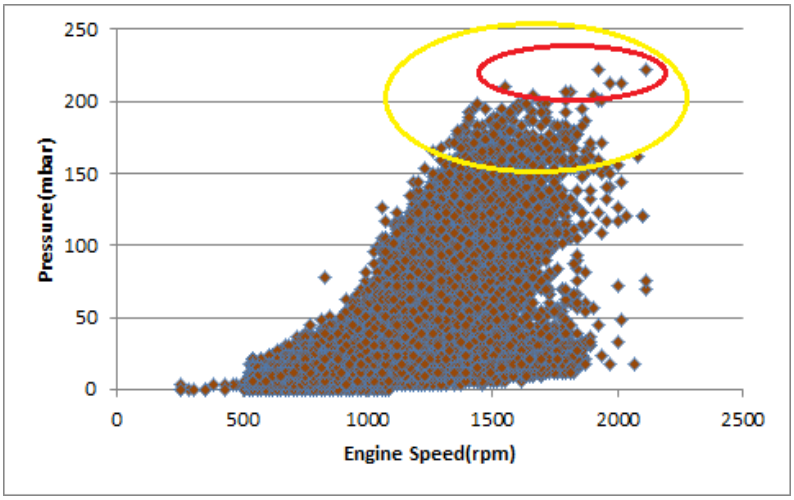


Figure 13- Pressure against engine speed

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

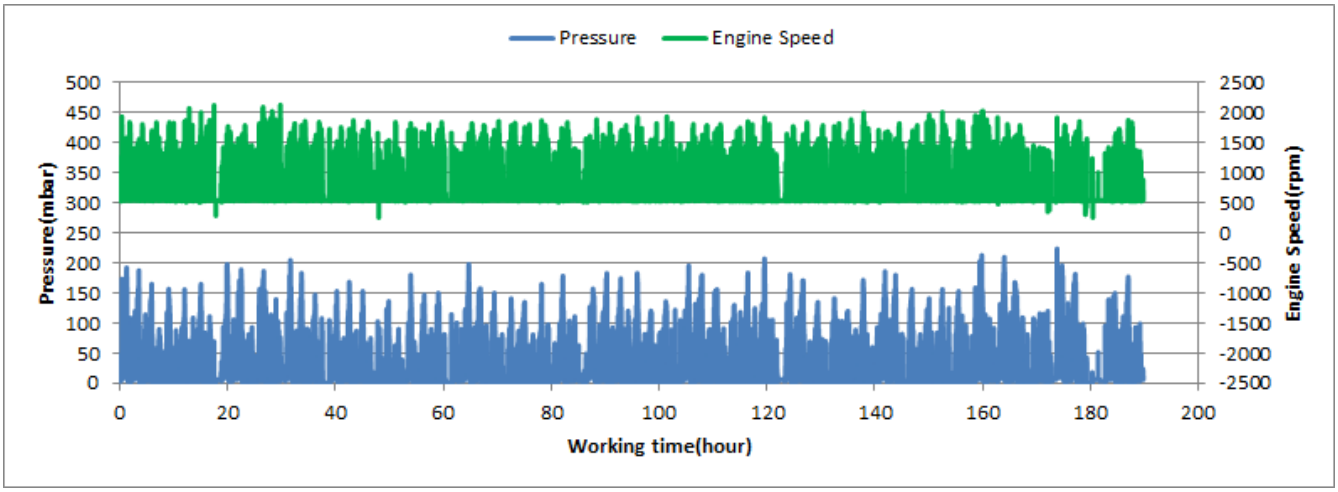


Figure 14- P, N distribution vs. working hours

Notice: Active regeneration prediction is hard from figure 14. It seemed active regeneration didn't happened due to high temperature distribution. For more exact comment, DPF's ECU needs to be checked.

Temperature- Engine Speed Diagram

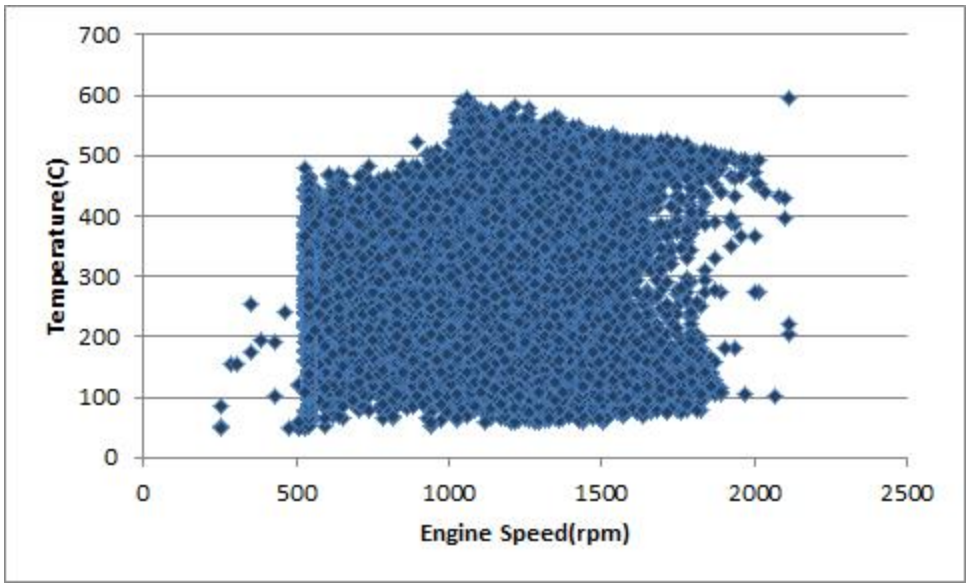


Figure 15- Temperature against engine speed

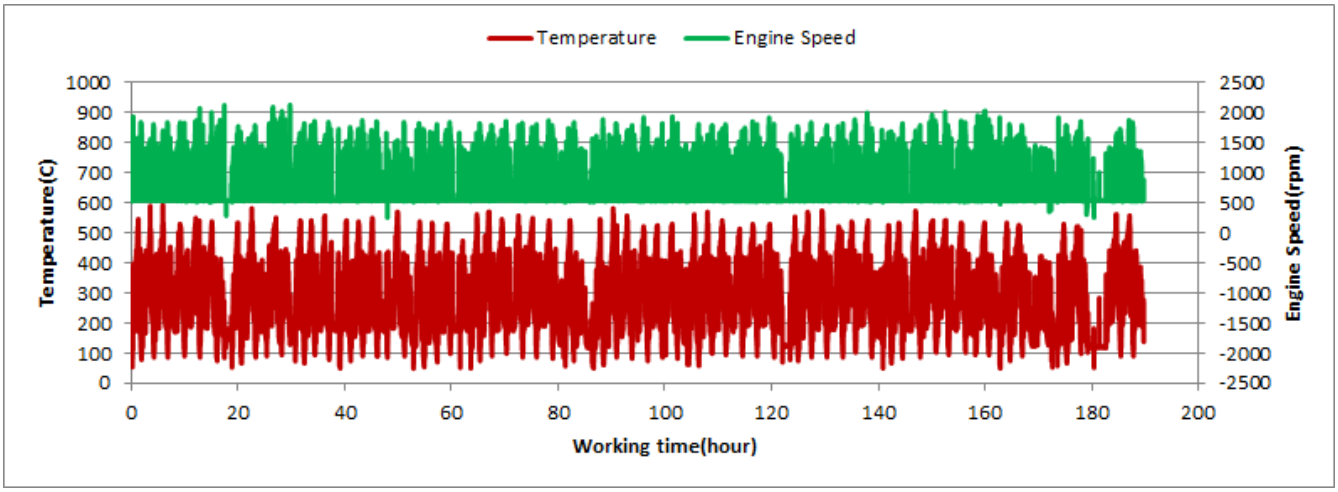


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1 only 0.02% of total working time, pressure is above 200 mbar and 0.72% above 150mbar. So it can be concluded that operation of this filter is fully acceptable in this condition.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 13% of total working time, temperature is above 400 ℃ and 22% above 350℃.
- This vehicle operates in line 4, so due to path characteristic of this line, engine operates in high speed.

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

Overall Information

Table 1- 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	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	HJS_02 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Jun/2015 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	1.03 $[m^{-1}]$
K value – DPF's downstream	0.02 $[m^{-1}]$

Table 2- Maintenance Table

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)	21733 km
Bus mileage over the period	2389 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	199 hours, 54 minutes
Average working hours per a day (including stop days)	13 hours, 20 minutes
Bus average speed	11.95 km/hr
Idle speed time to all working time ration	54%
Total bus fuel consumption over the period	1438 lit
Fuel consumption per hour	7.20 lit/hr
Average fuel consumption	0.60 lit/km
Total bus additive consumption over the period	0.647 lit
Average additive consumption	0.271 cc/km
Additive consumption to fuel ration	450 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

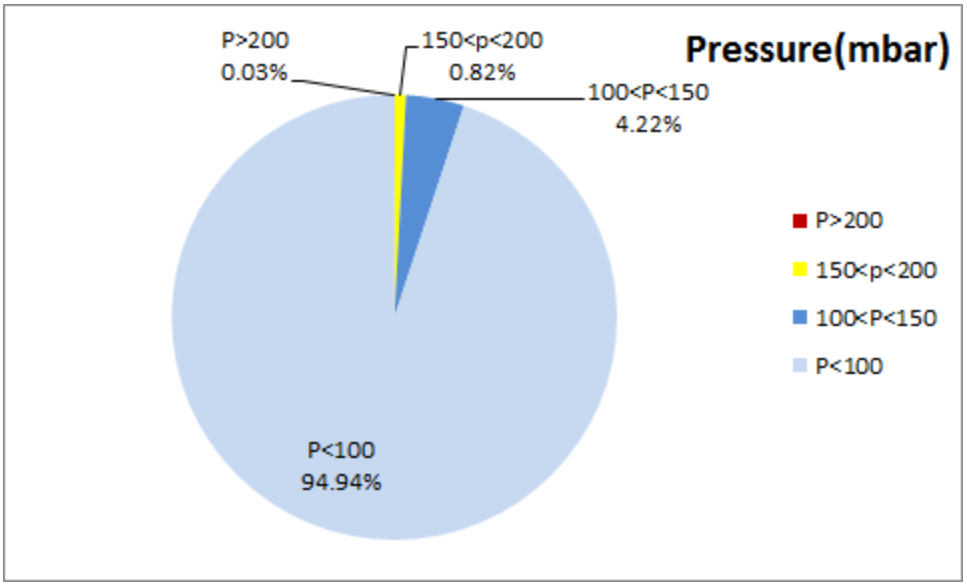


Figure 1- Pressure distribution over the working hours

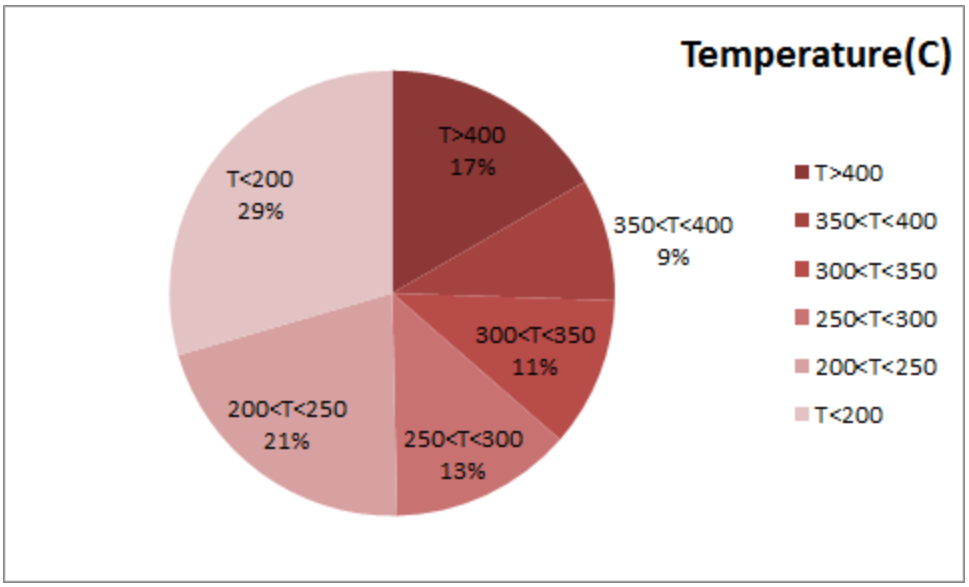


Figure 2-Temperature[1] distribution over the working hours

[1]- Flow temperature (DPF's upstream)

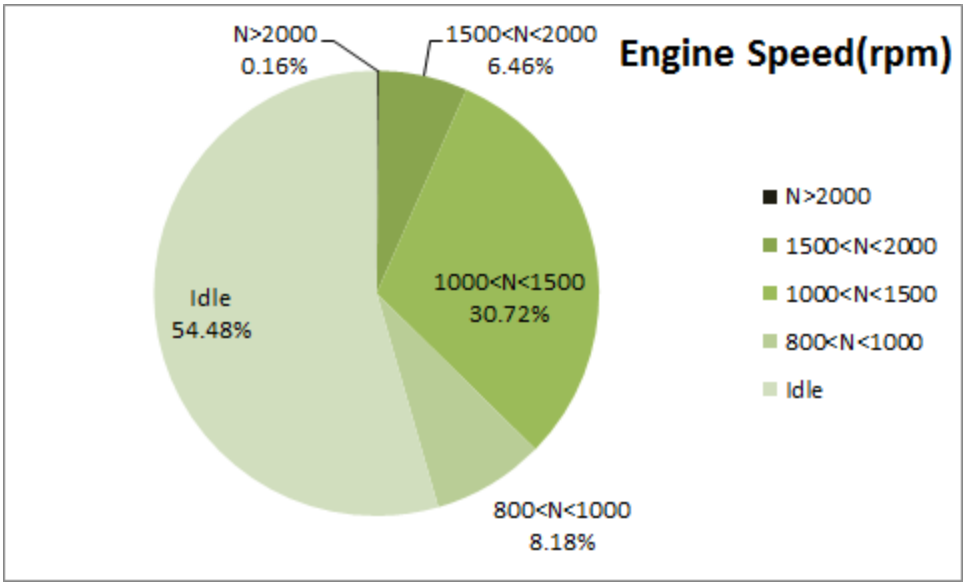


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
278.27	23.21	867

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
343.88	46.62	1231

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
606-50	225-0	2304-256

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

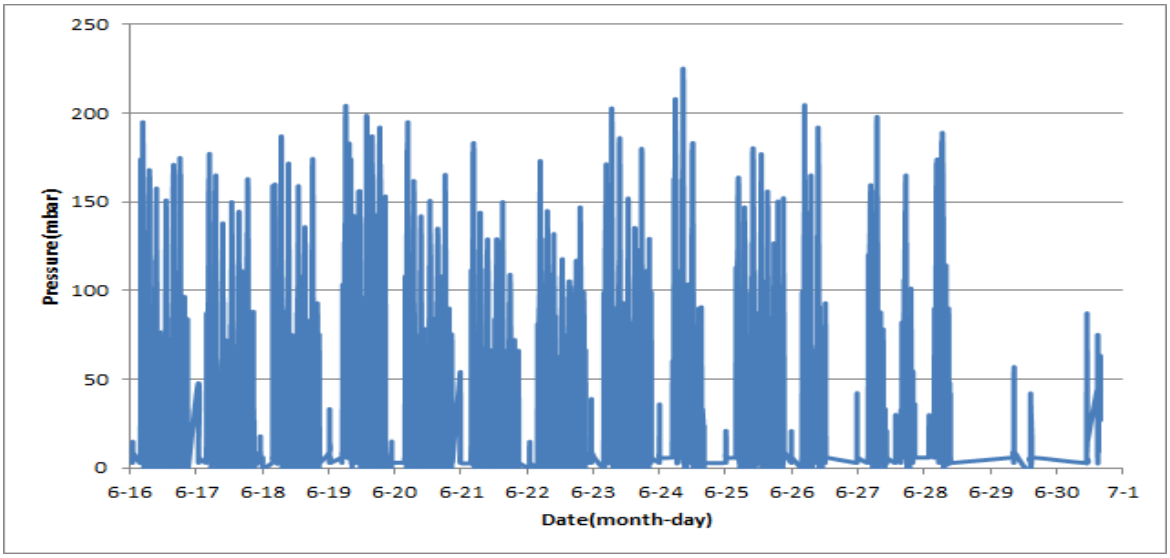


Figure 4- Pressure distribution over the fifteen days

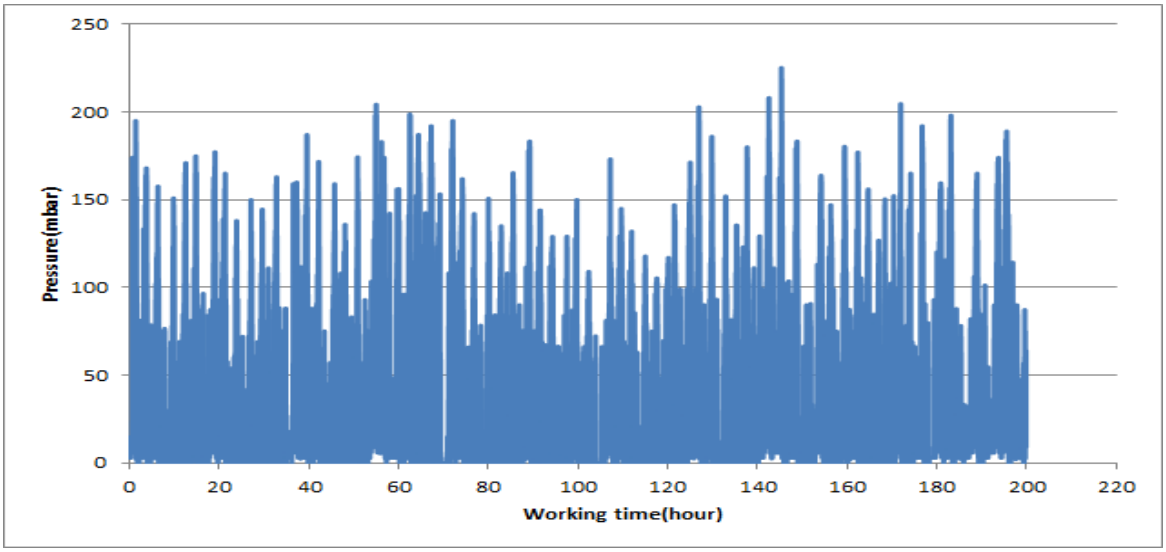


Figure 5- Pressure vs. working hours

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

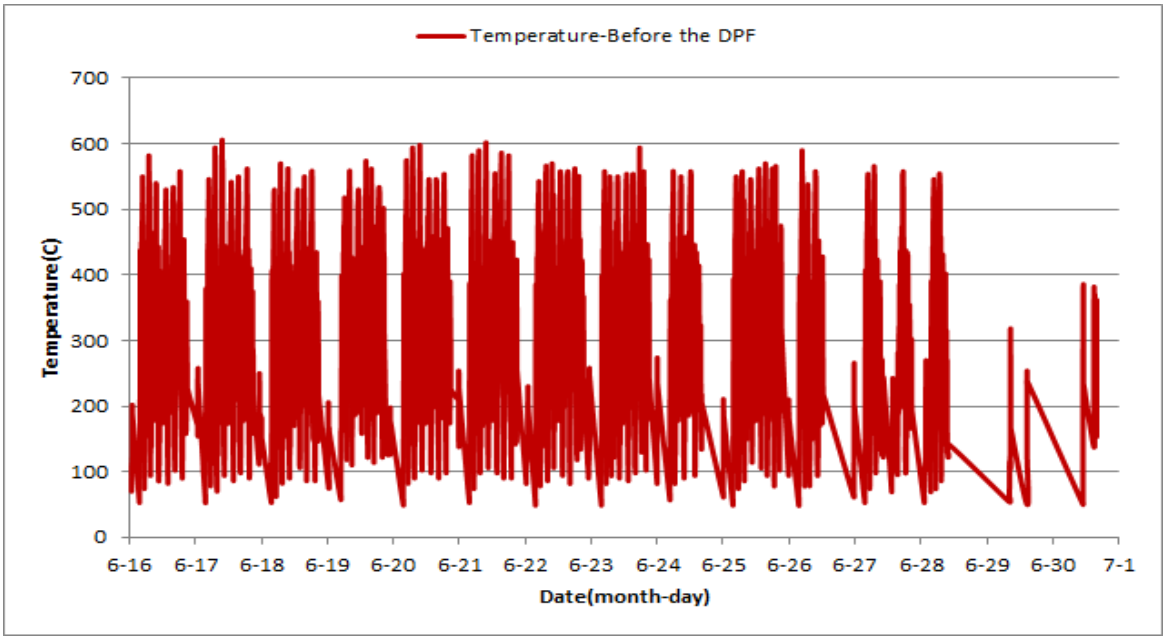


Figure 6- Temperature distribution over the fifteen days

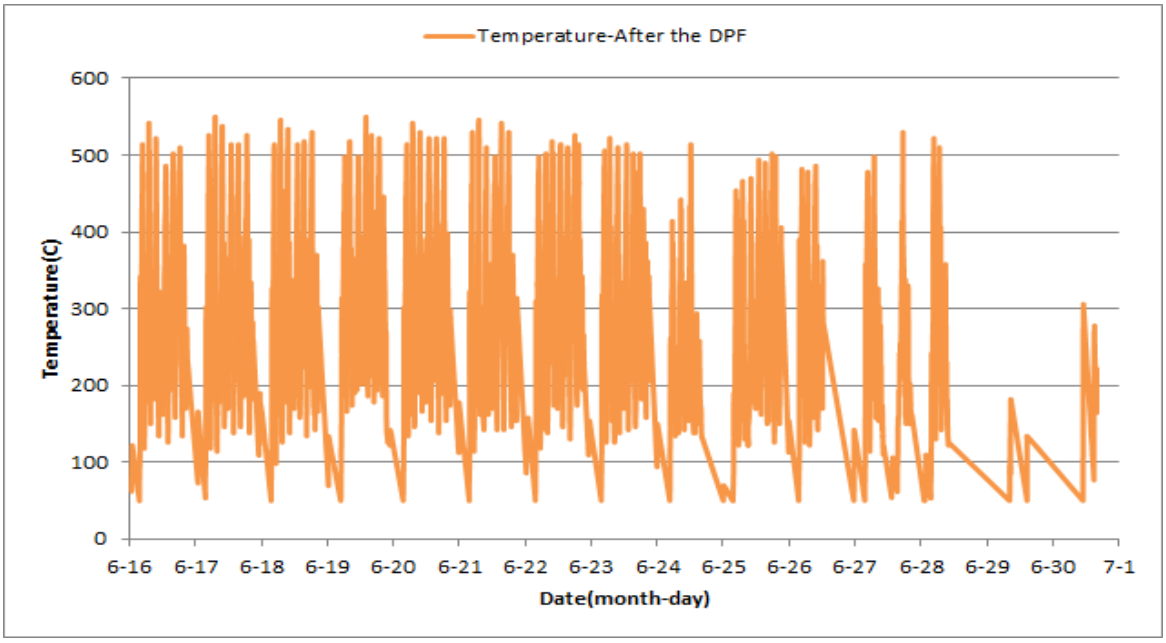


Figure 7- Temperature distribution over the fifteen days

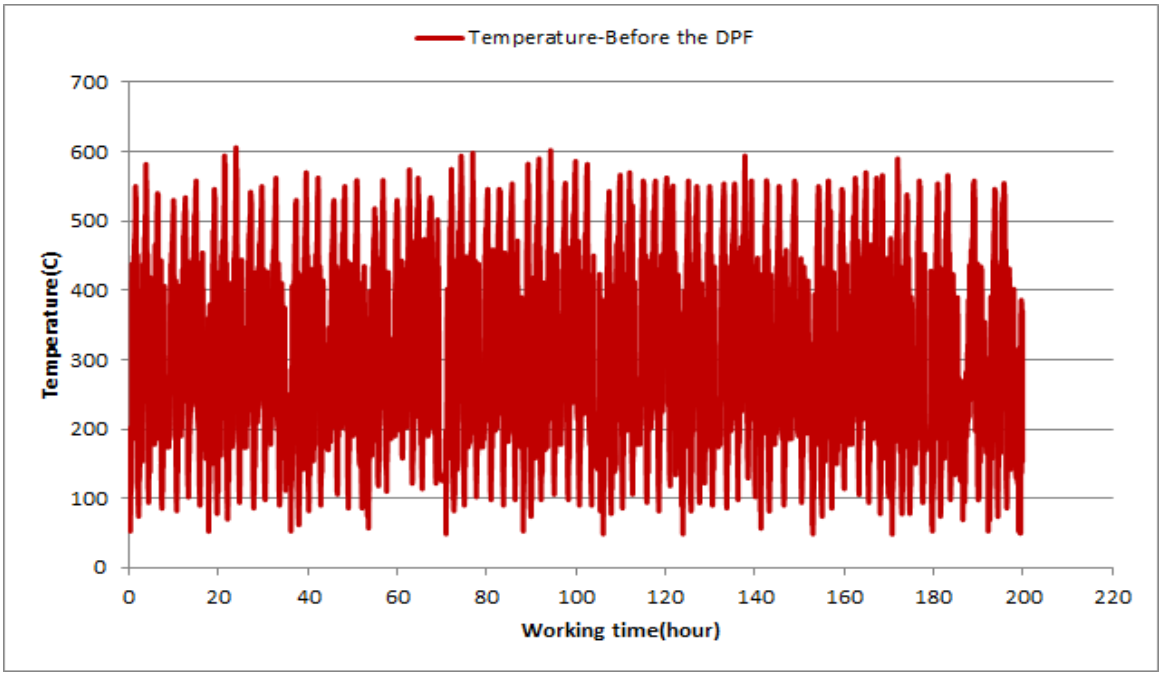


Figure 8- Temperature vs. working hours

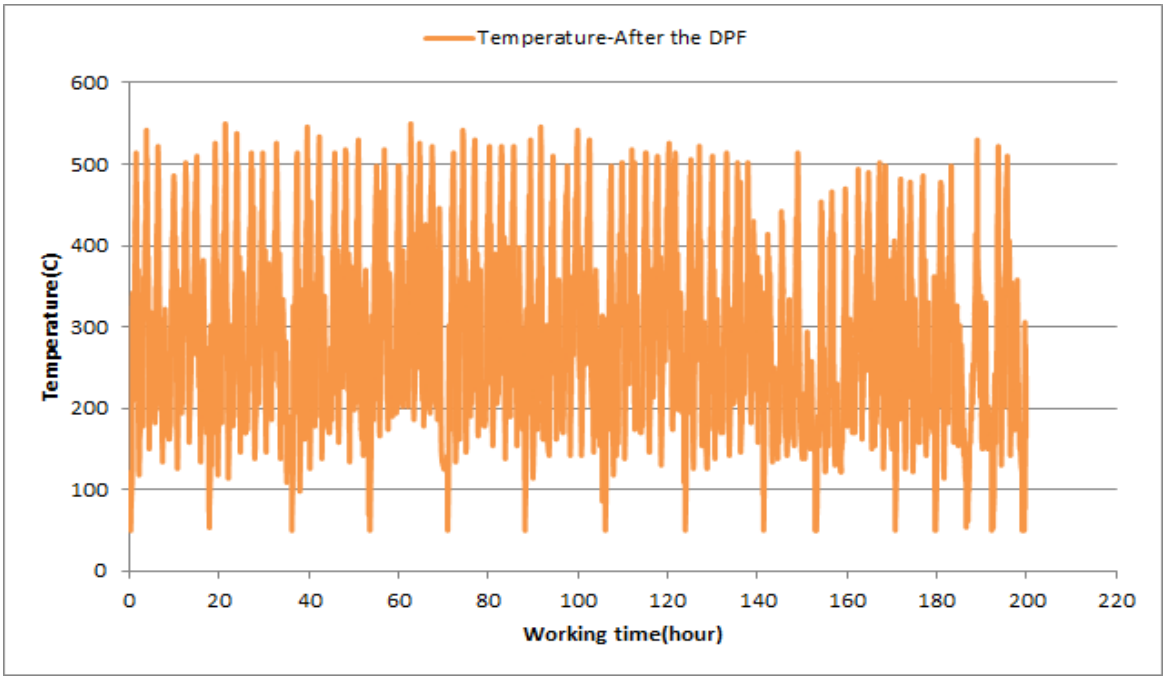


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

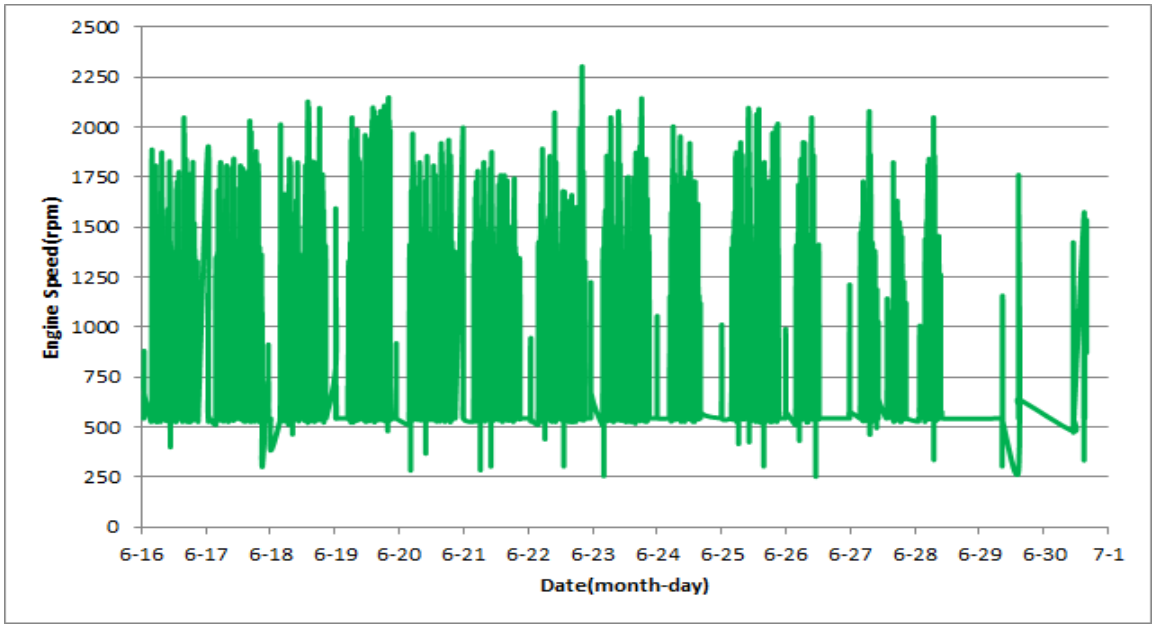


Figure 10- Engine speed distribution over the fifteen days

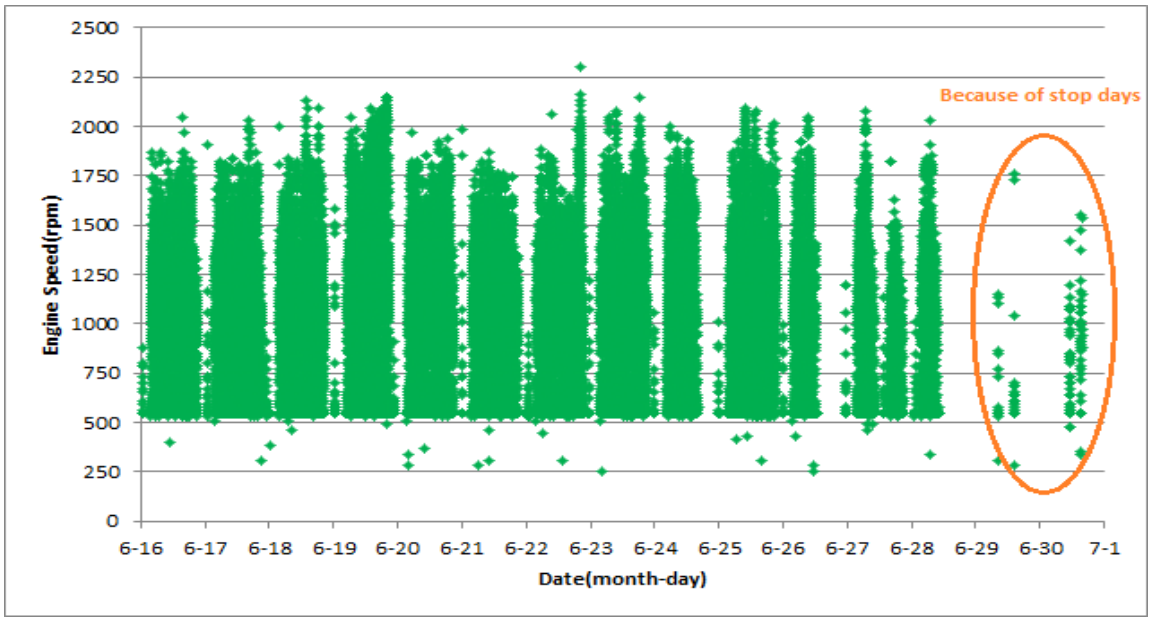


Figure 11- Engine speed diagram for calculating CPK's working days

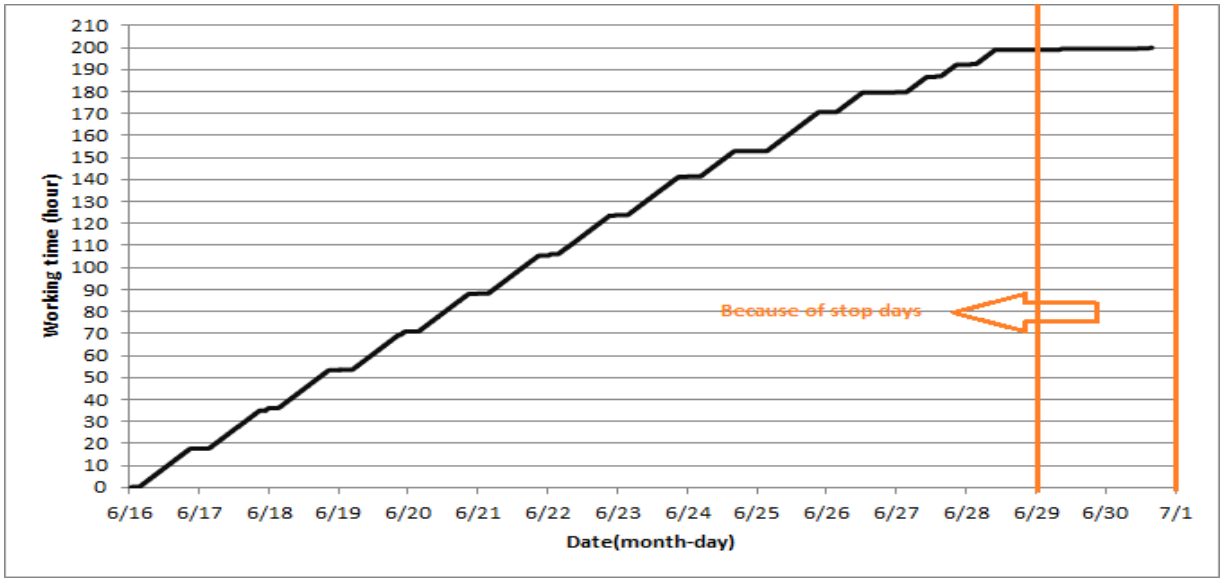


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

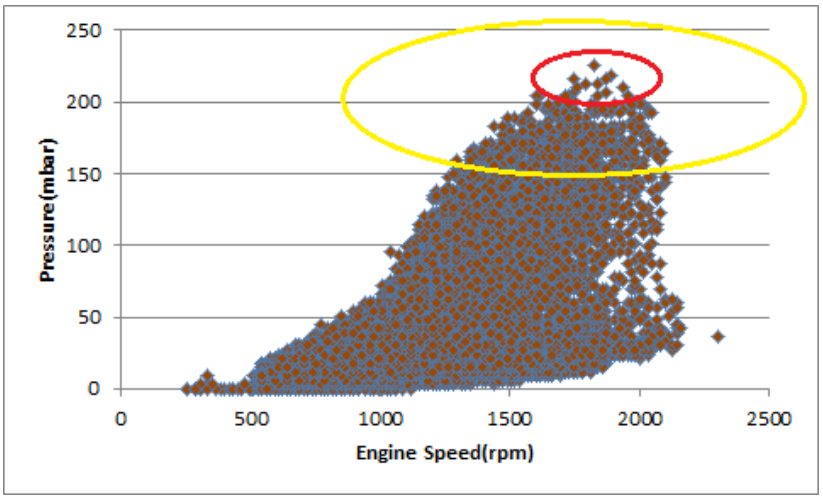


Figure 13- Pressure against engine speed

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

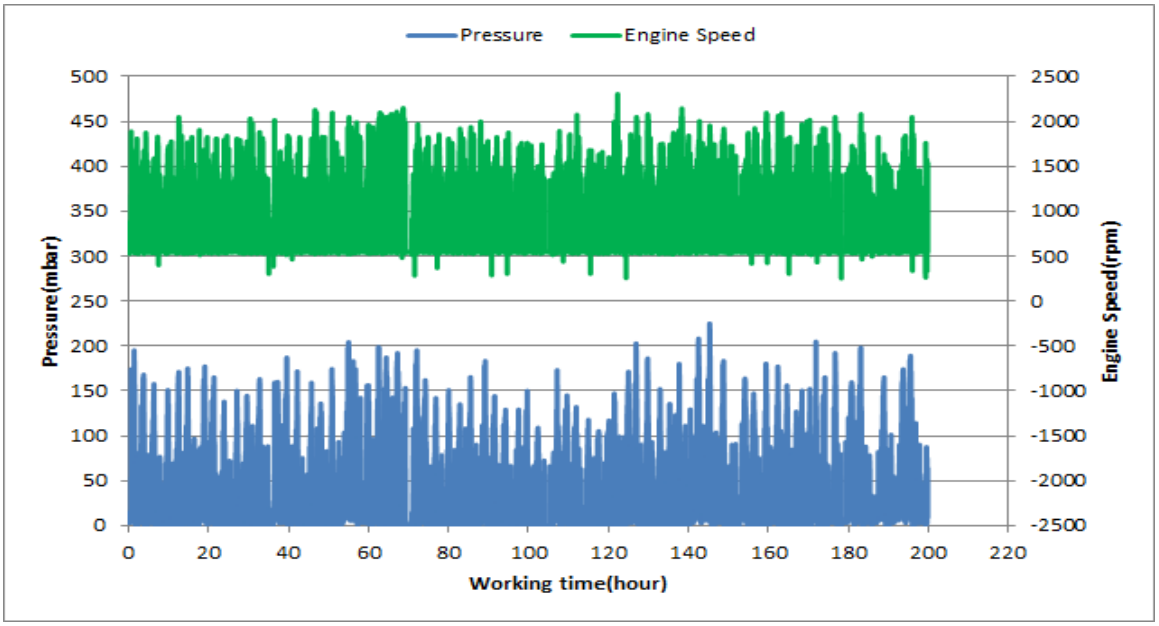


Figure 14- P, N distribution vs. working hours

Notice: Active regeneration prediction is hard from figure 14. It seemed active regeneration didn't happened due to high temperature distribution. For more exact comment, DPF's ECU needs to be checked.

Temperature- Engine Speed Diagram

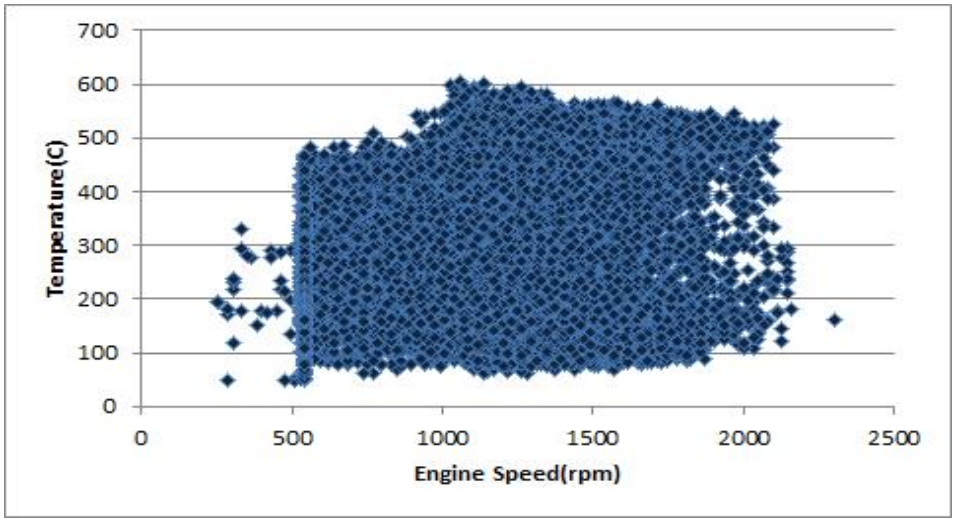


Figure 15- Temperature against engine speed

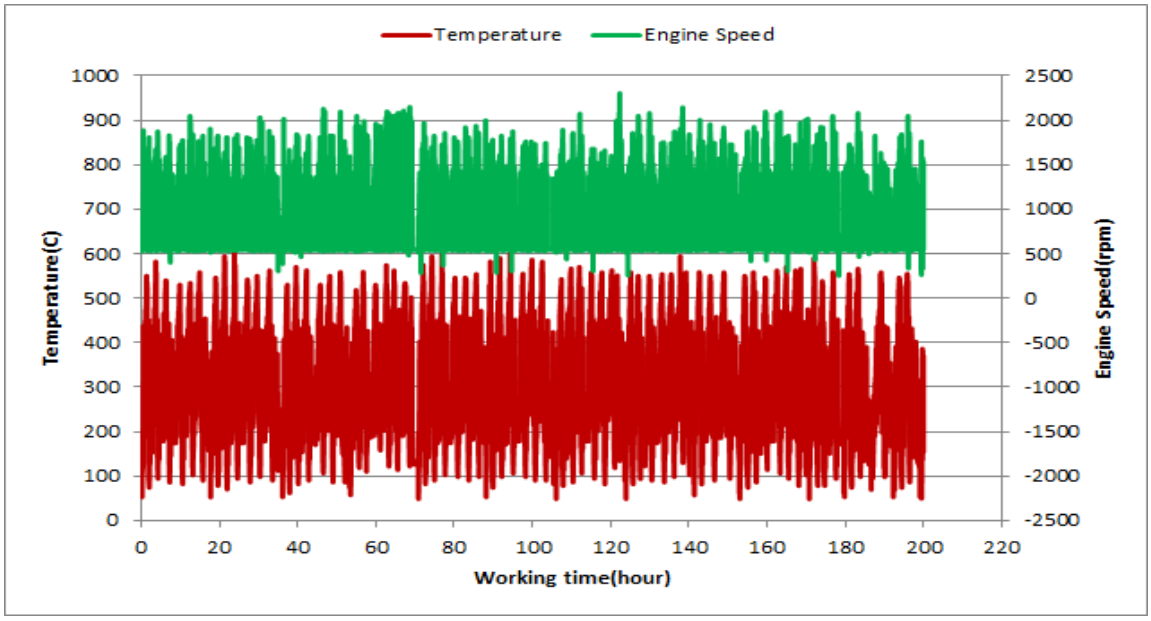


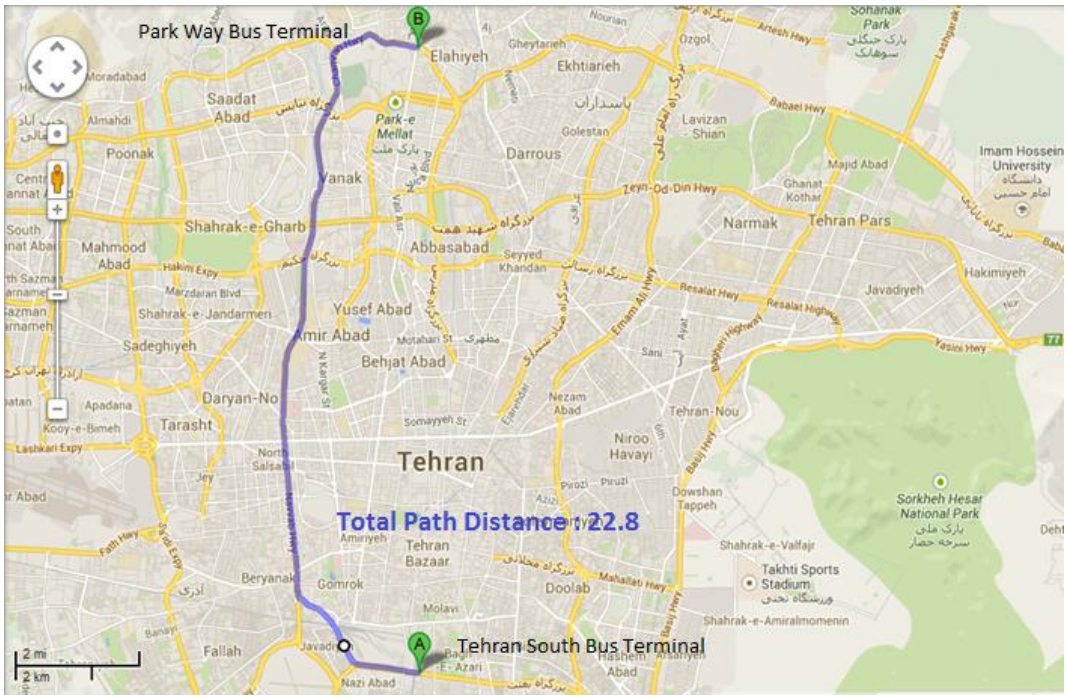
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.03% of total working time pressure is above 200 mbar and 0.85% above 150mbar. So it can be concluded that this DPF operated excellently during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 17% of total working-time temperature is above 400 °C and 26% above 350°C.
- 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

Table 1- 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/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	1.10 $[m^{-1}]$
K value – DPF's downstream	0.06 $[m^{-1}]$

Table 2- Maintenance Table

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)	33456
Bus mileage over the period	2450 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	195 hours, 25 minutes
Average working hours per a day (including stop days)	13 hours, 2 minutes
Bus average speed	12.54 km/hr
Idle speed time to all working time ration	58%
Total bus fuel consumption over the period	1691 lit
Fuel consumption per hour	8.6 lit/hr
Average fuel consumption	0.69 lit/km
Total bus additive consumption over the period	0.44 lit
Average additive consumption	0.180 cc/km
Additive consumption to fuel ration	260 cc per 1000 lit (continuous dosing)

Temperature, Pressure and Engine Speed Overview

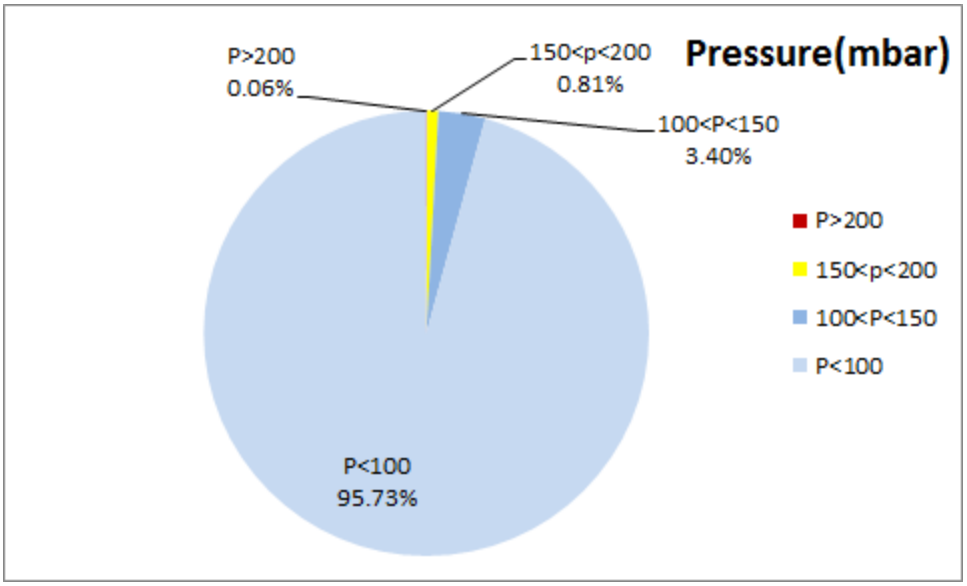


Figure 1- Pressure distribution over the working hours

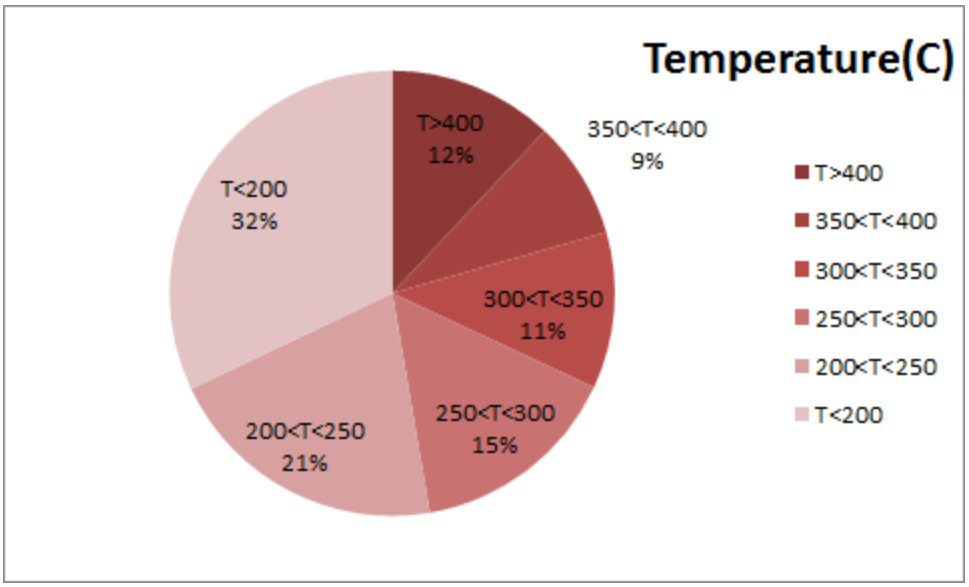


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

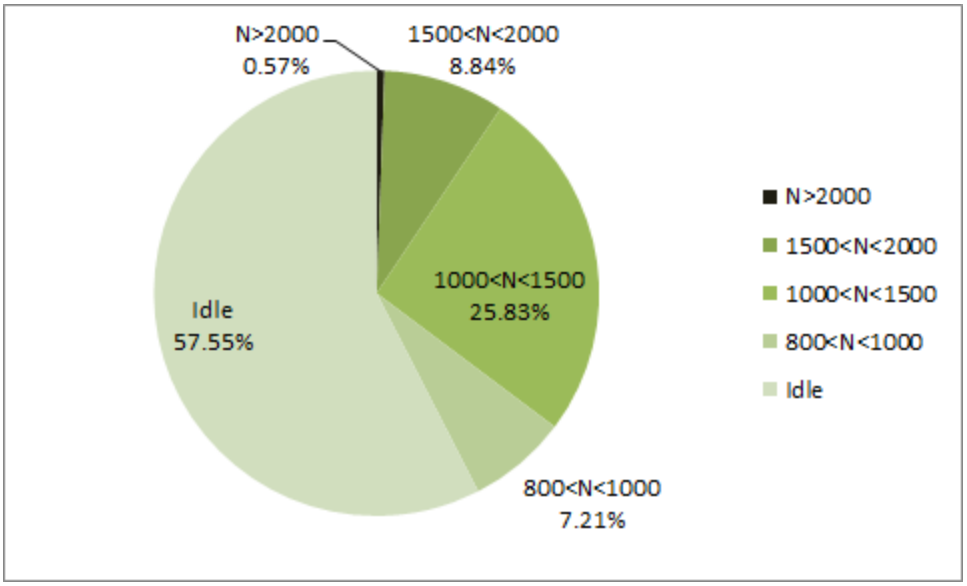


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2] (C)	Mean pressure(mbar)	Mean engine speed(rpm)
263.01	21.04	865

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
323.17	44.46	1272

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
566-50	237-0	2464-3

[2]- Flow temperature (DPF's upstream)

Detailed Pressure Analysis

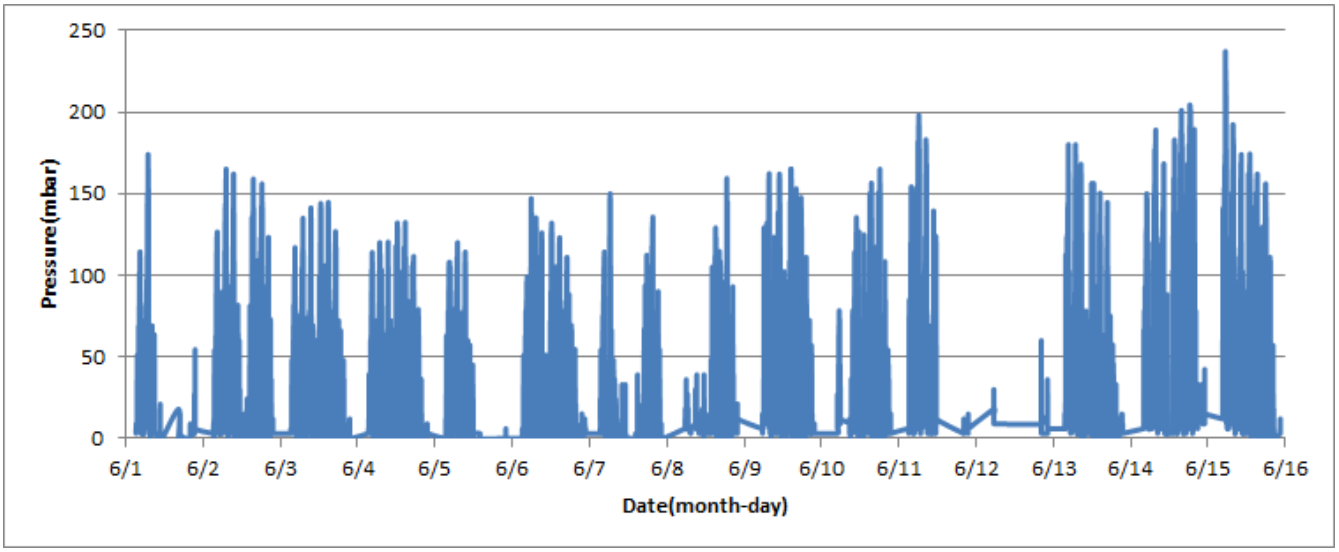


Figure 4- Pressure distribution over the fifteen days

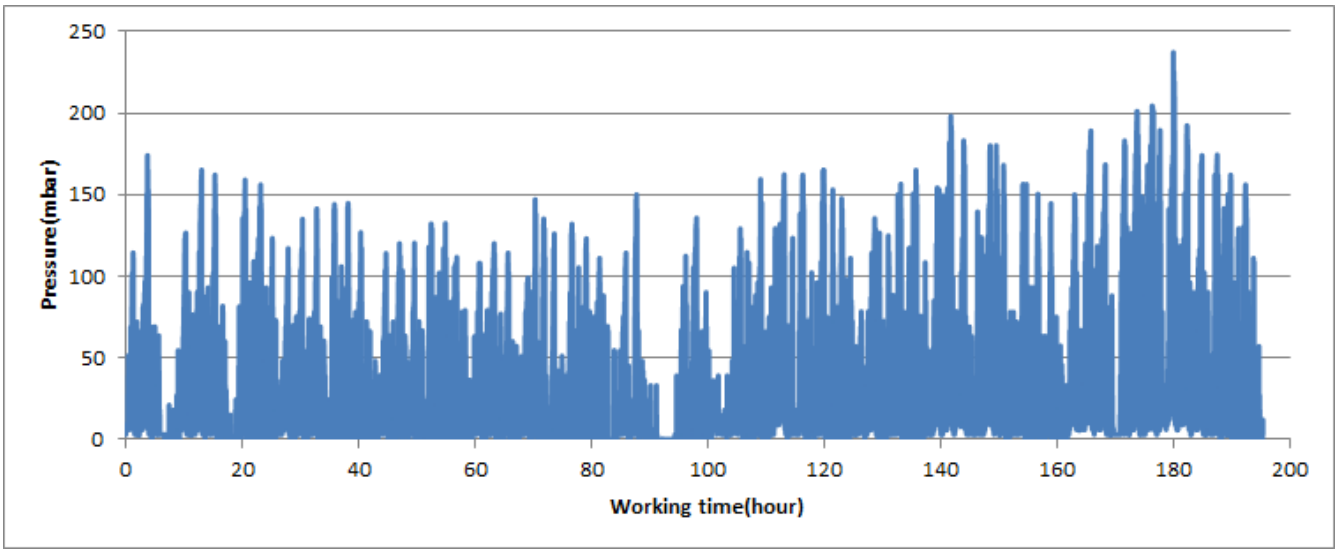


Figure 5- Pressure vs. working hours

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

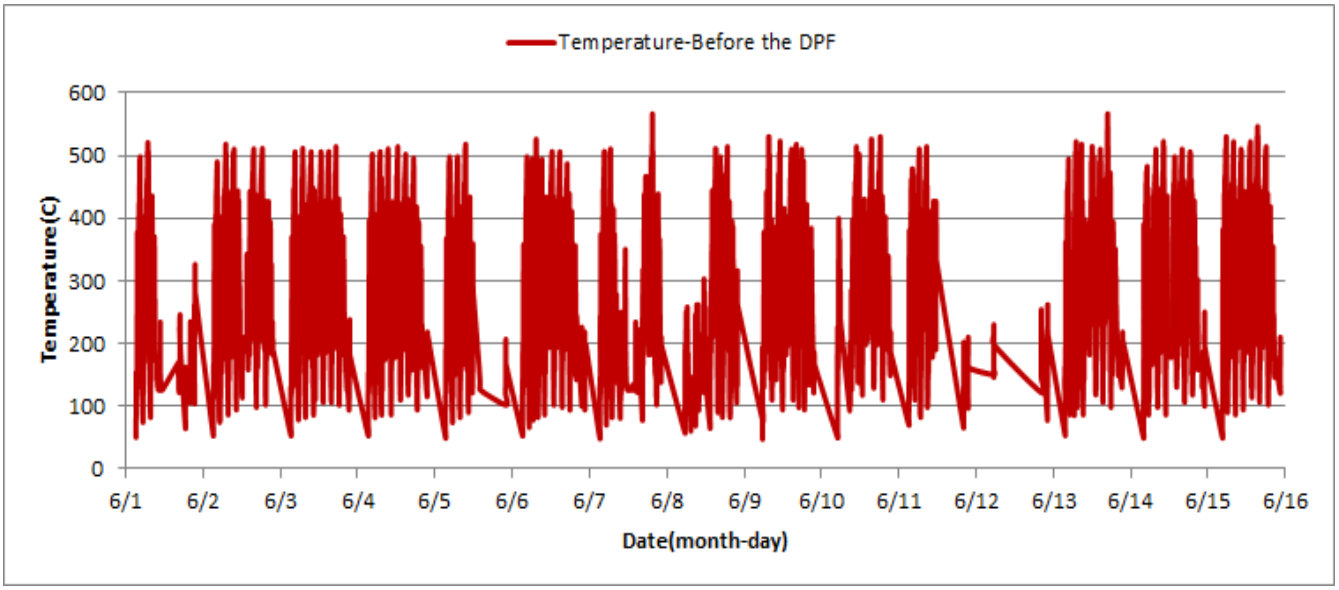


Figure 6- Temperature distribution over the fifteen days

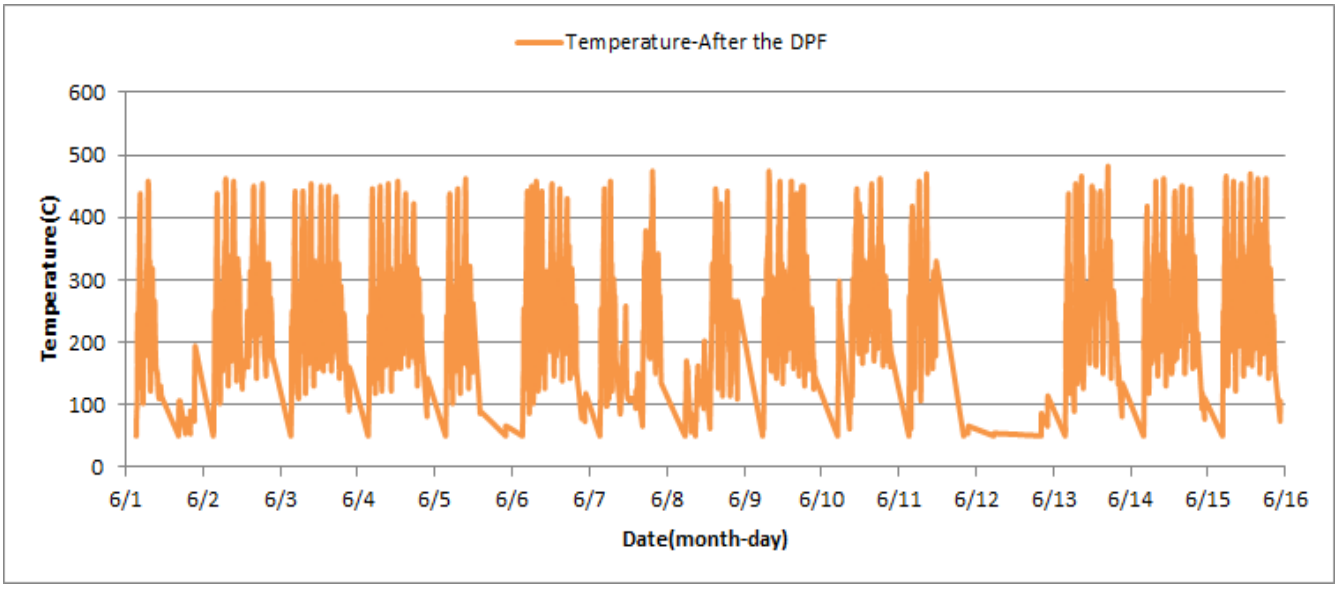


Figure 7- Temperature distribution over the fifteen days

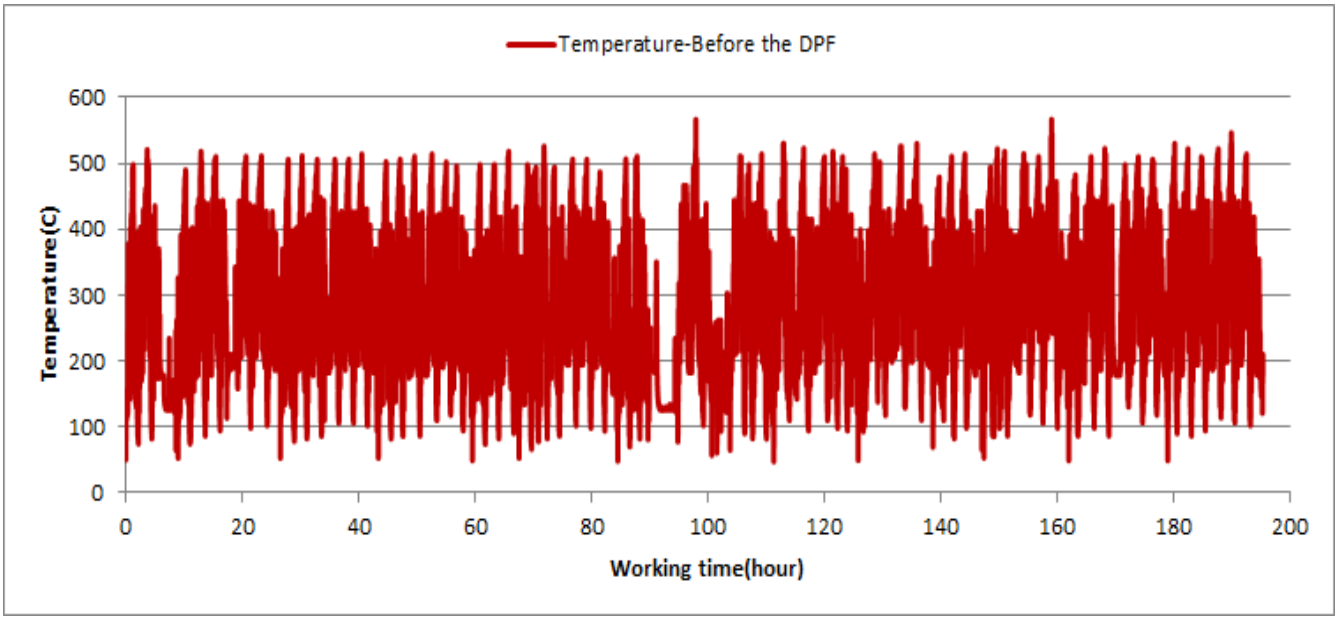


Figure 8- Temperature vs. working hours

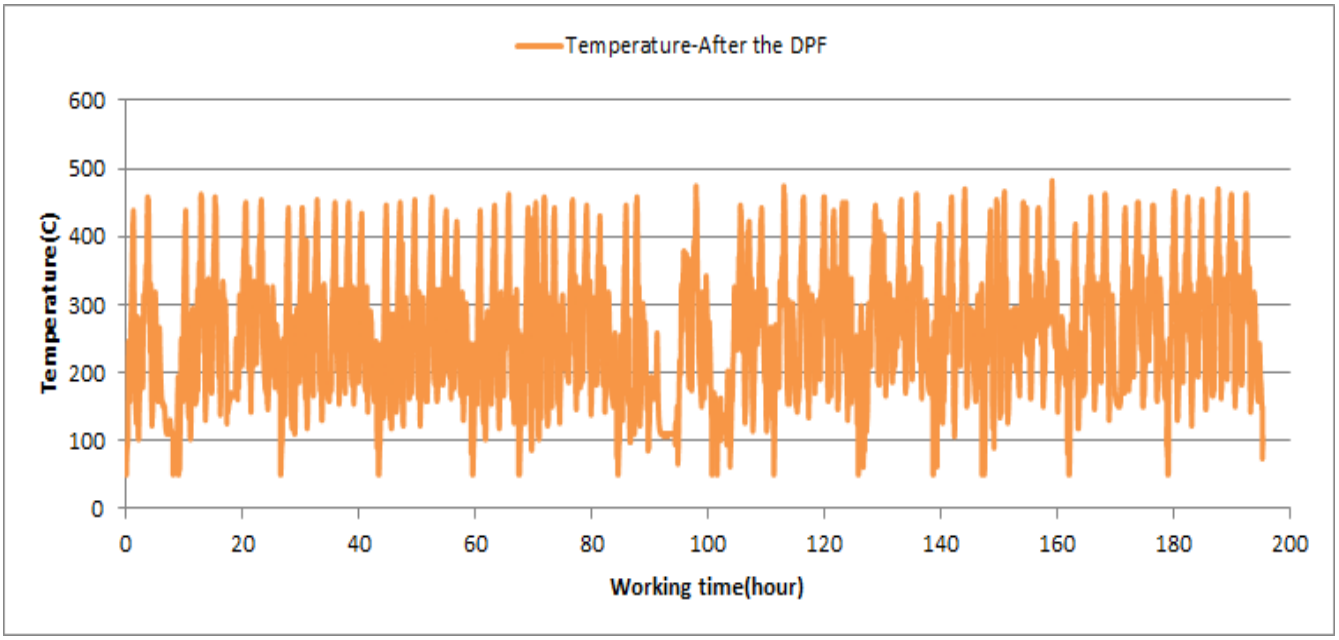


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

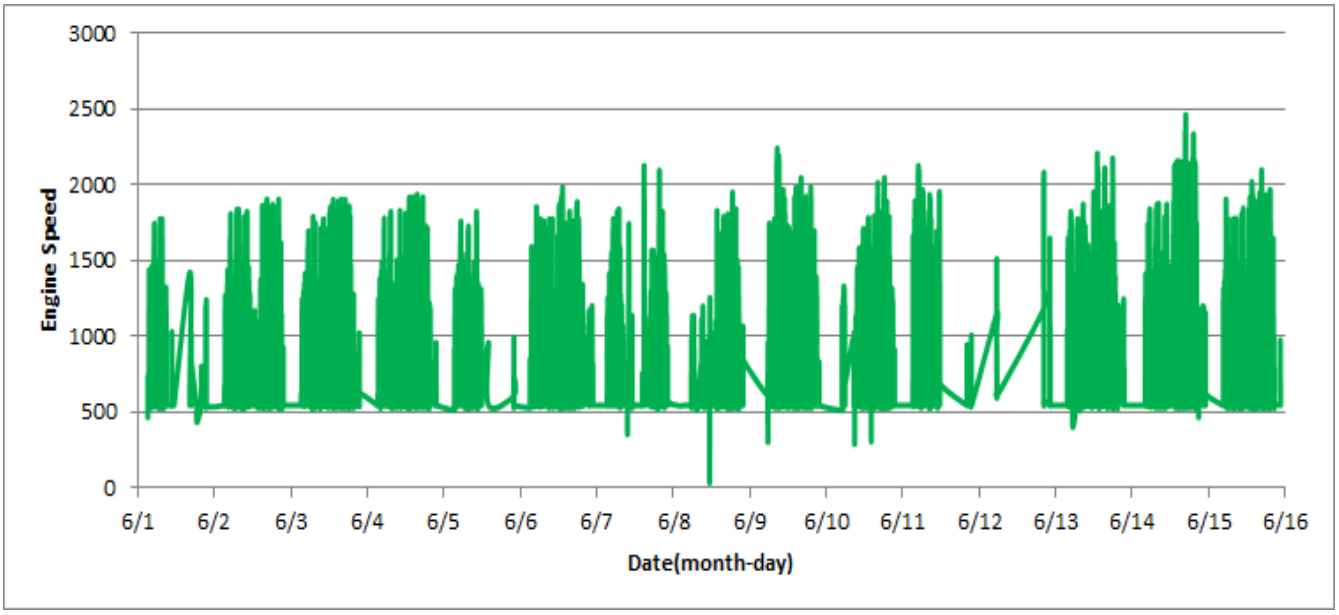


Figure 10- Engine speed distribution over the fifteen days

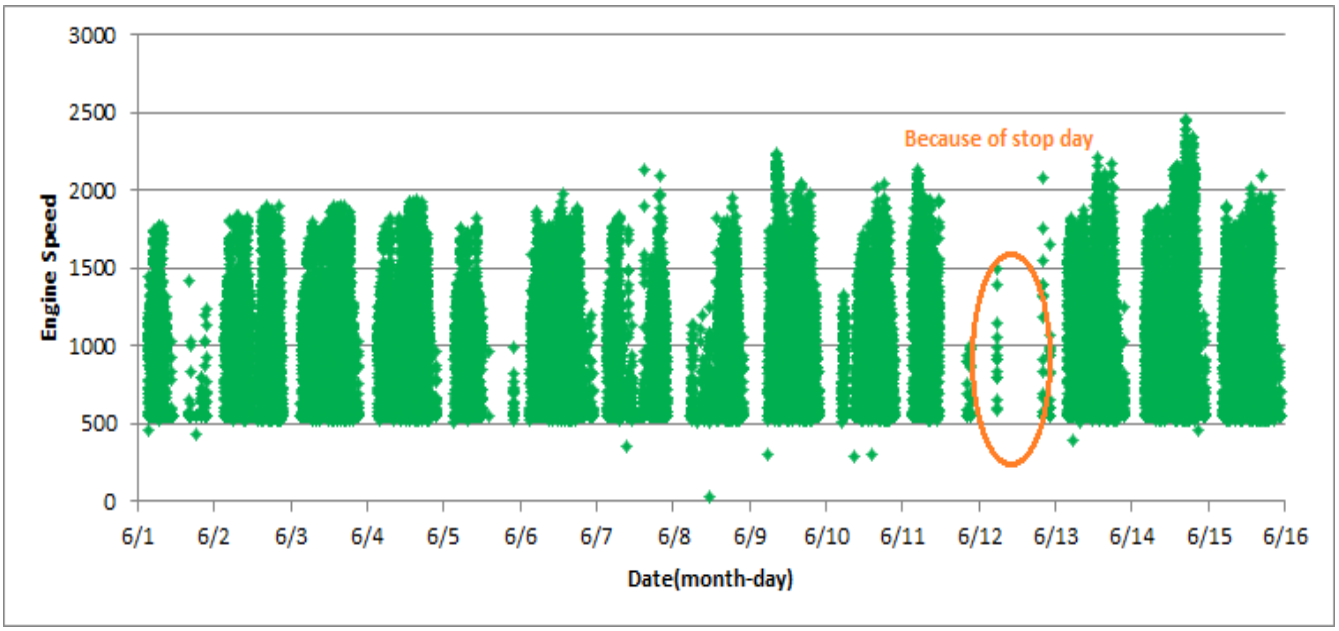


Figure 11- Engine speed diagram for calculating CPK's working days

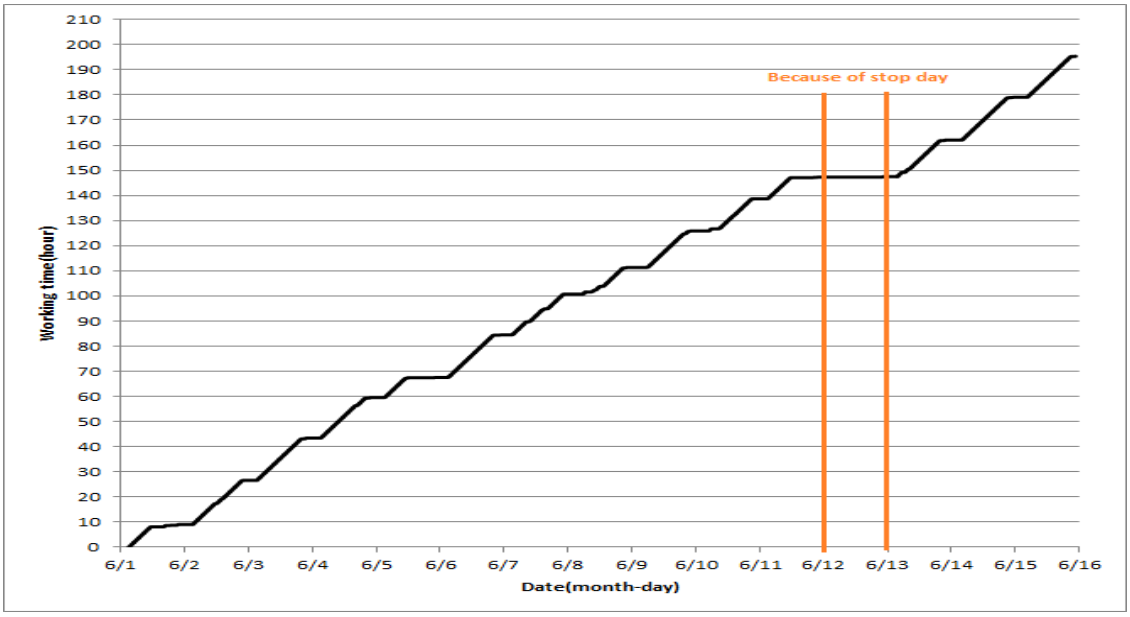


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

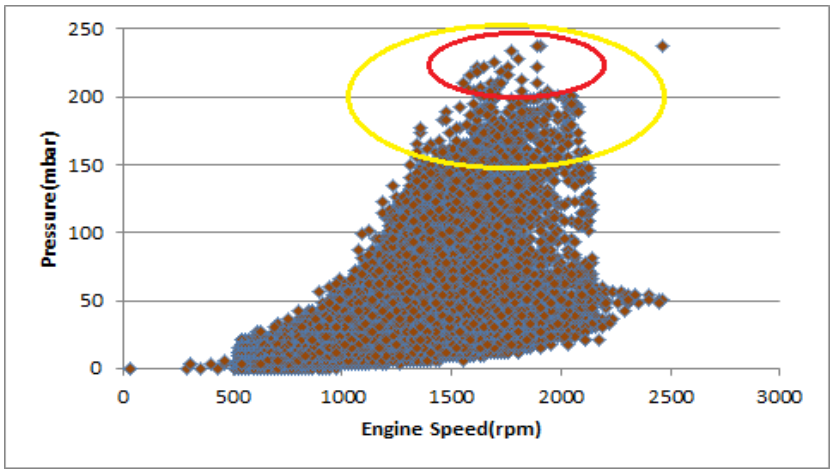


Figure 13- Pressure against engine speed

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

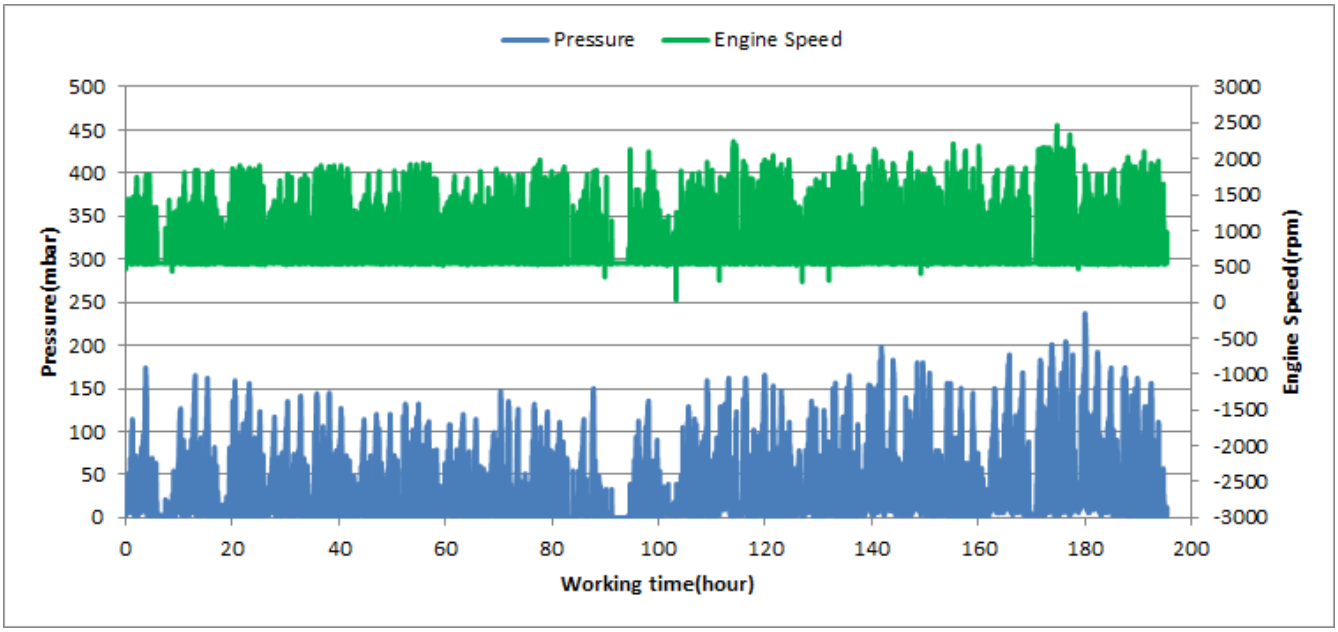


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

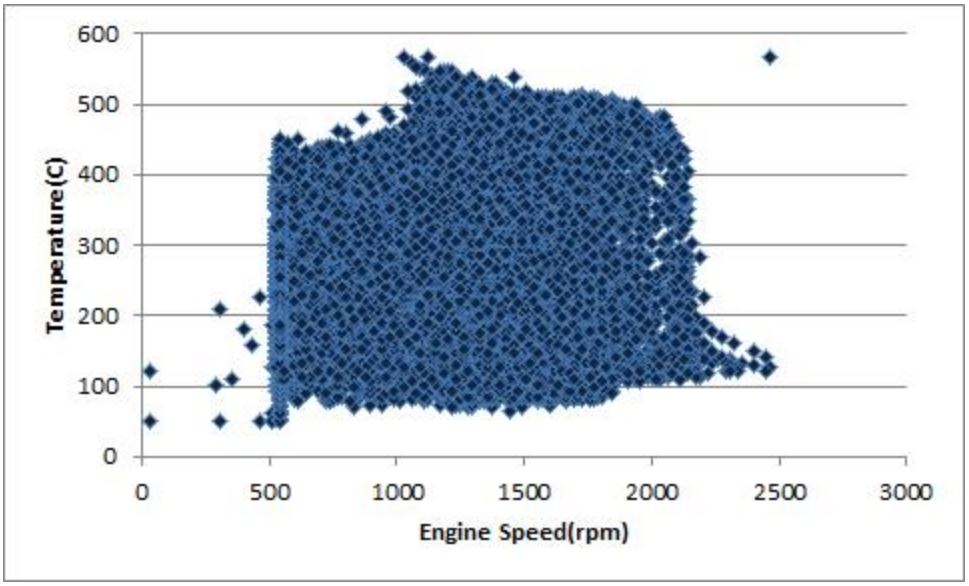


Figure 15- Temperature against engine speed

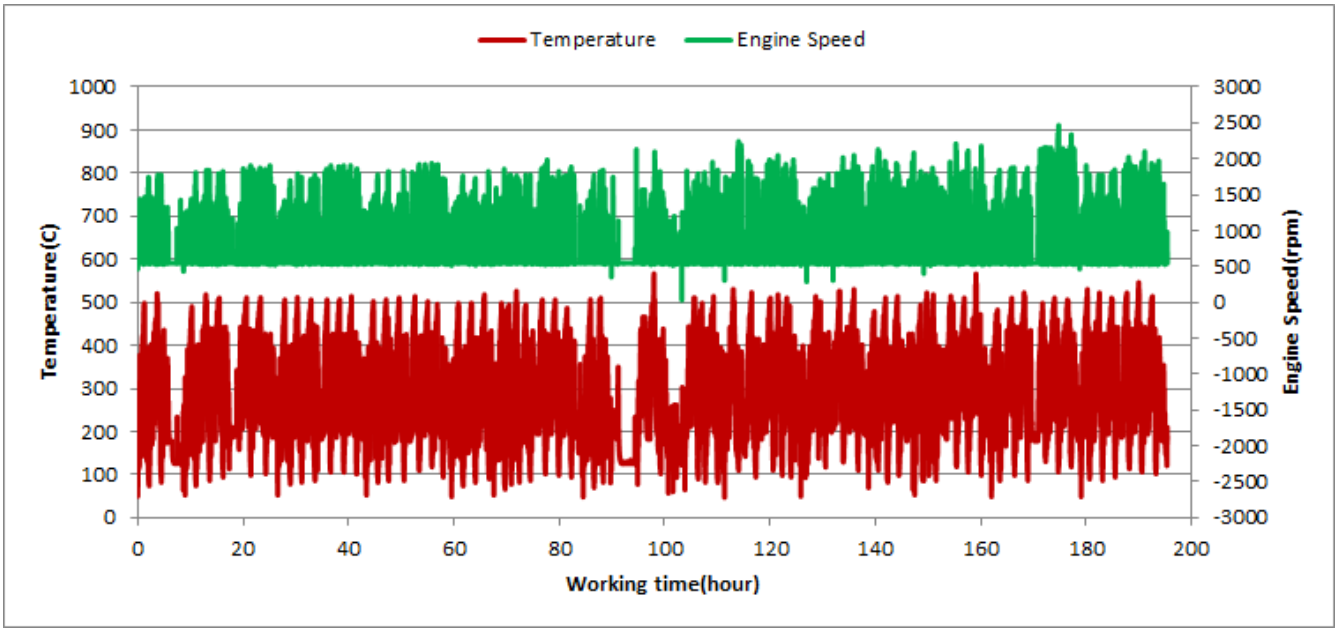


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, 0.06% of total working time pressure is above 200 mbar and only 0.87% 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 °C and 21% above 350°C.

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

Overall Information

Table 1- 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 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	1.10 $[m^{-1}]$
K value – DPF's downstream	0.06 $[m^{-1}]$

Table 2- Maintenance Table

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)	36176
Bus mileage over the period	2720 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	9 days
Working hours over the period	$134.75 + (4 \times 14.97)$ $= 194 \text{ hours}, 38 \text{ minutes}^*$
Average working hours per a day (including stop days)	12 hours, 58 minutes
Bus average speed	13.98 km/hr
Idle speed time to all working time ration	59%
Total bus fuel consumption over the period	1760 lit
Fuel consumption per hour	8.5 lit/hr
Average fuel consumption	0.65 lit/km
Total bus additive consumption over the period	0.45 lit
Average additive consumption	0.165 cc/km
Additive consumption to fuel ration	255 cc per 1000 lit (continuous dosing)

Notice: As depicted in Figure 12, data logger didn't sample for four days due to technical problems. So we add average working hours to calculated working hours from the data logger.

Temperature, Pressure and Engine Speed Overview

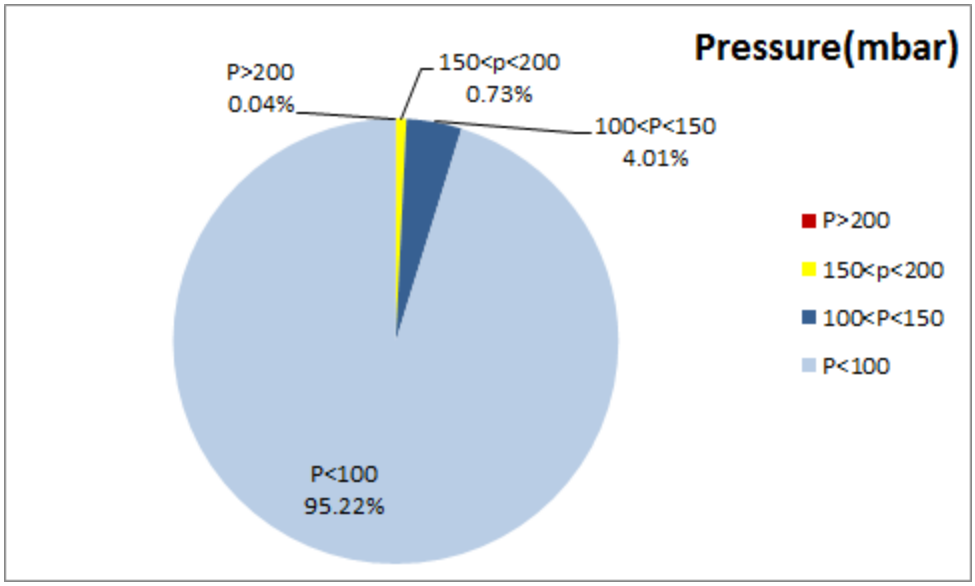


Figure 1- Pressure distribution over the working hours

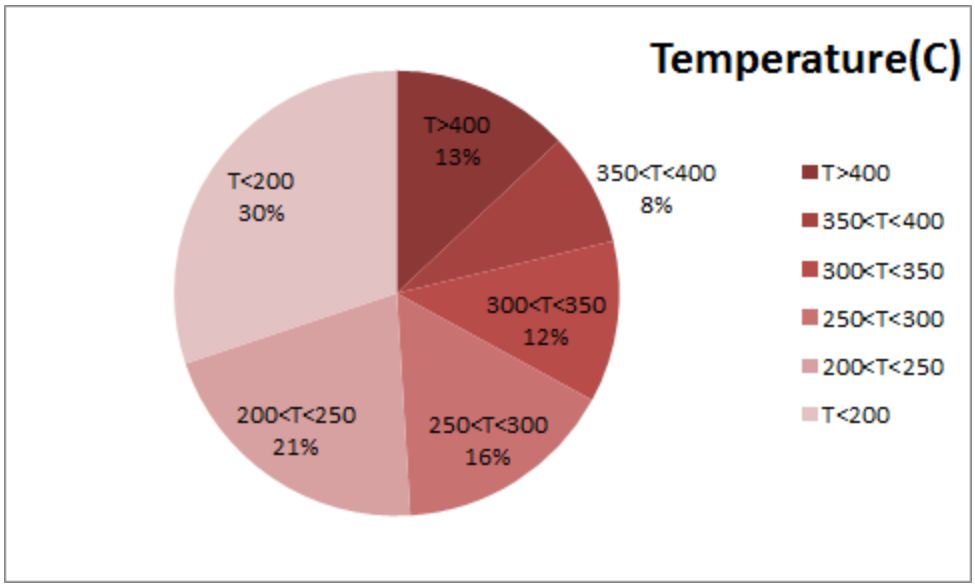


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

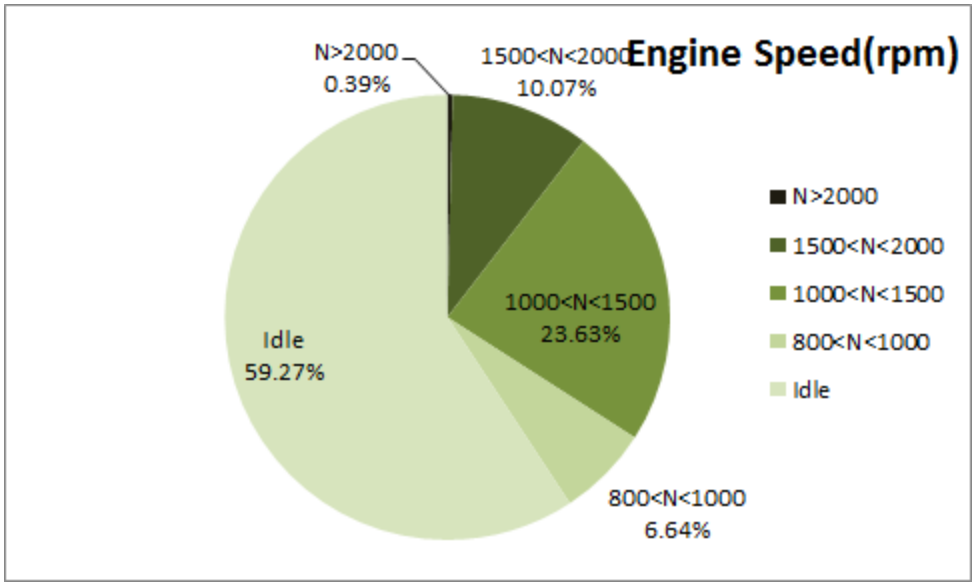


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

Table 4- Mean values

Mean temperature[2] (C)	Mean pressure(mbar)	Mean engine speed(rpm)
267.60	21.98	863

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
329.24	47.62	1297

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
562-50	210-0	2496-256

[2]- Flow temperature (DPF's upstream)

Detailed Pressure Analysis

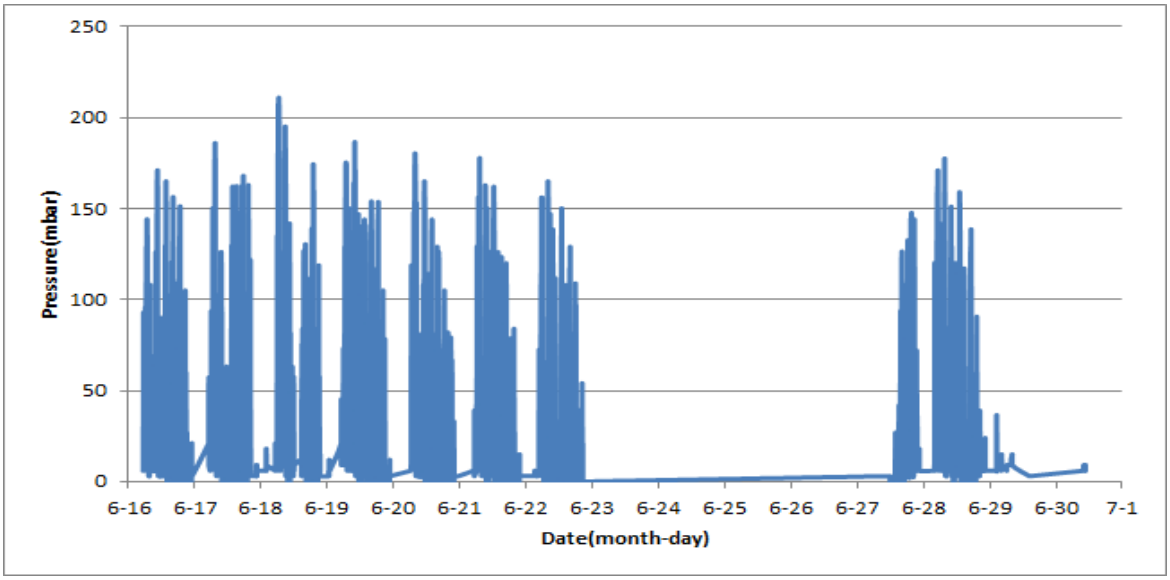


Figure 4- Pressure distribution over the fifteen days

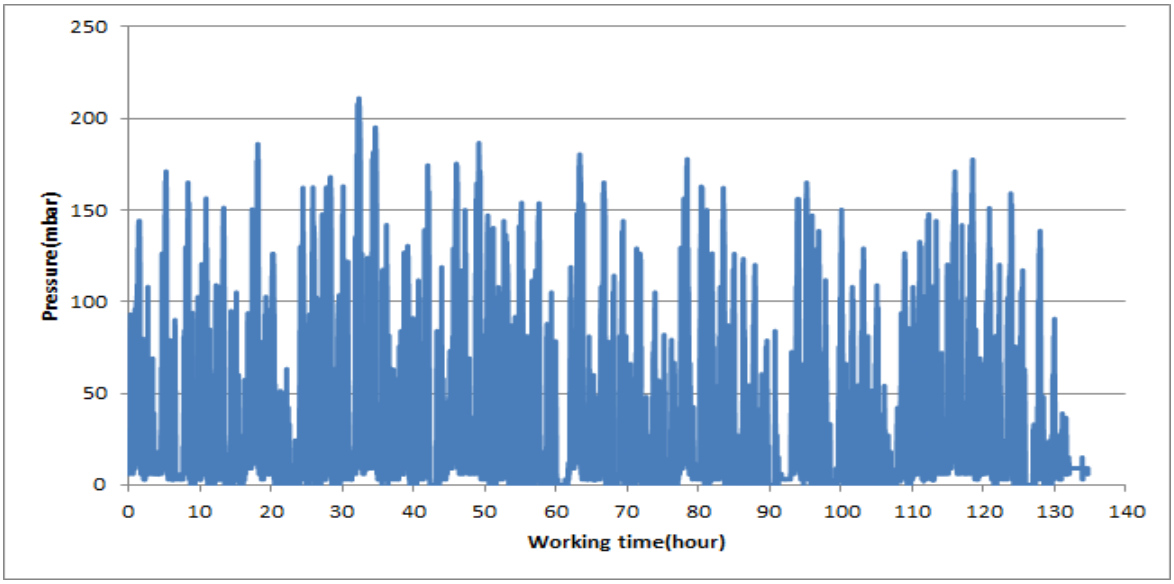


Figure 5- Pressure vs. working hours

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

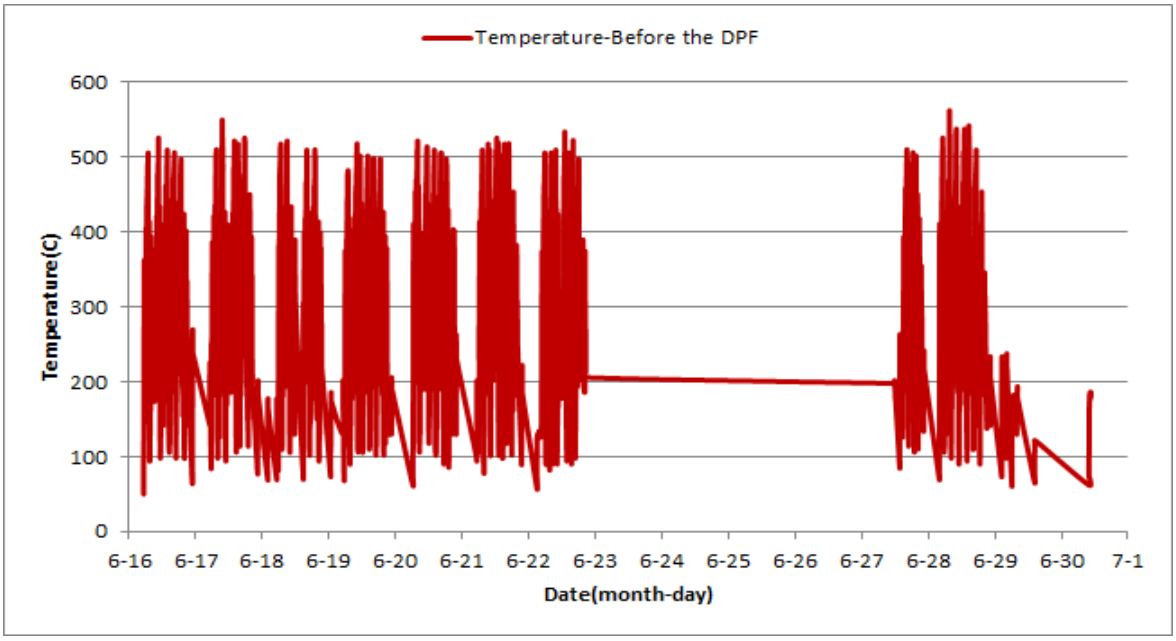


Figure 6- Temperature distribution over the fifteen days

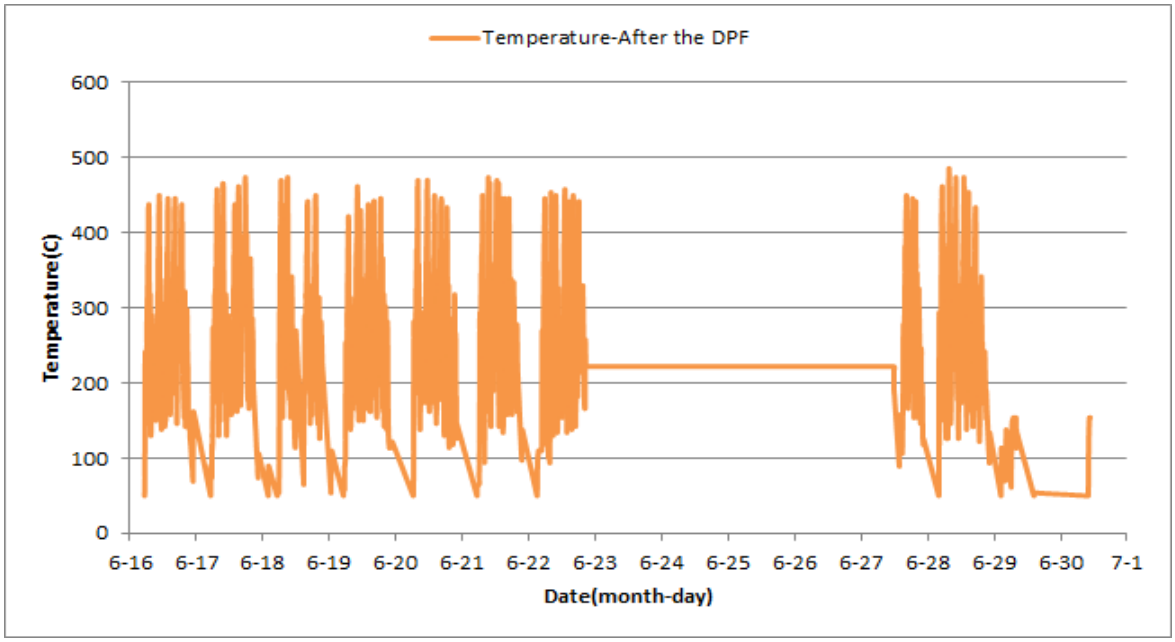


Figure 7- Temperature distribution over the fifteen days

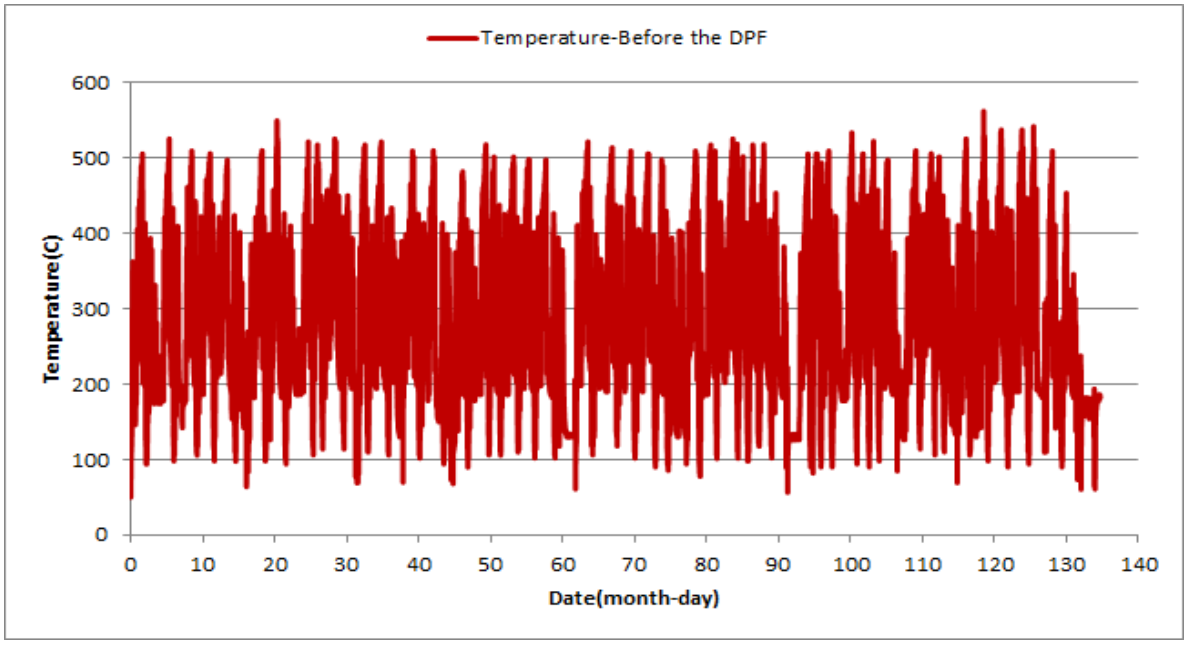


Figure 8- Temperature vs. working hours

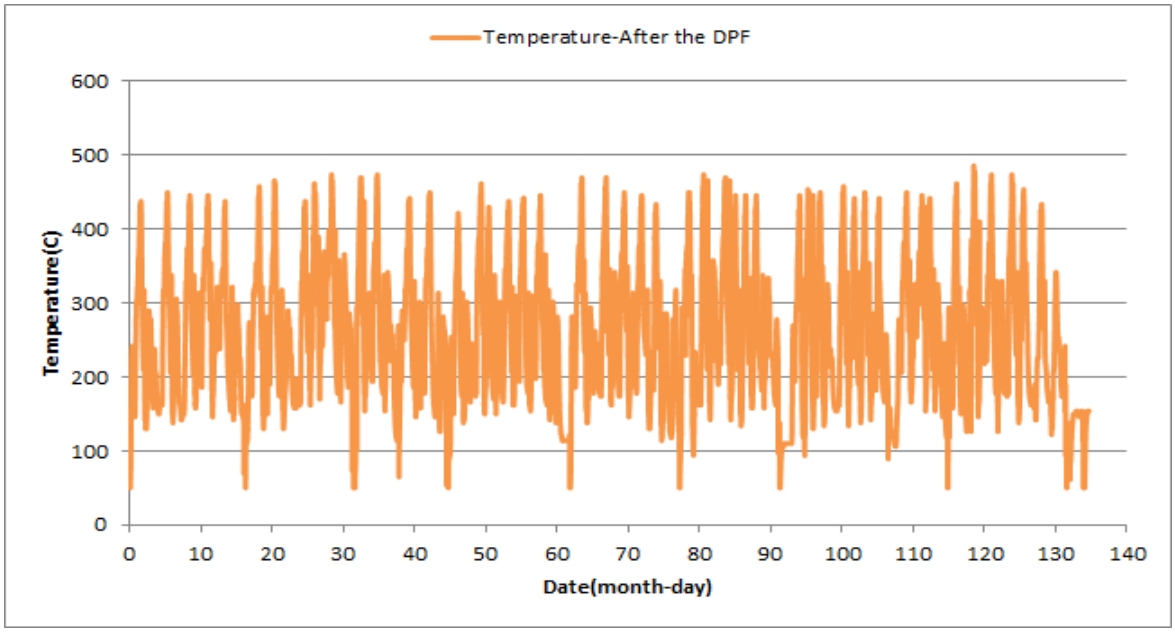


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

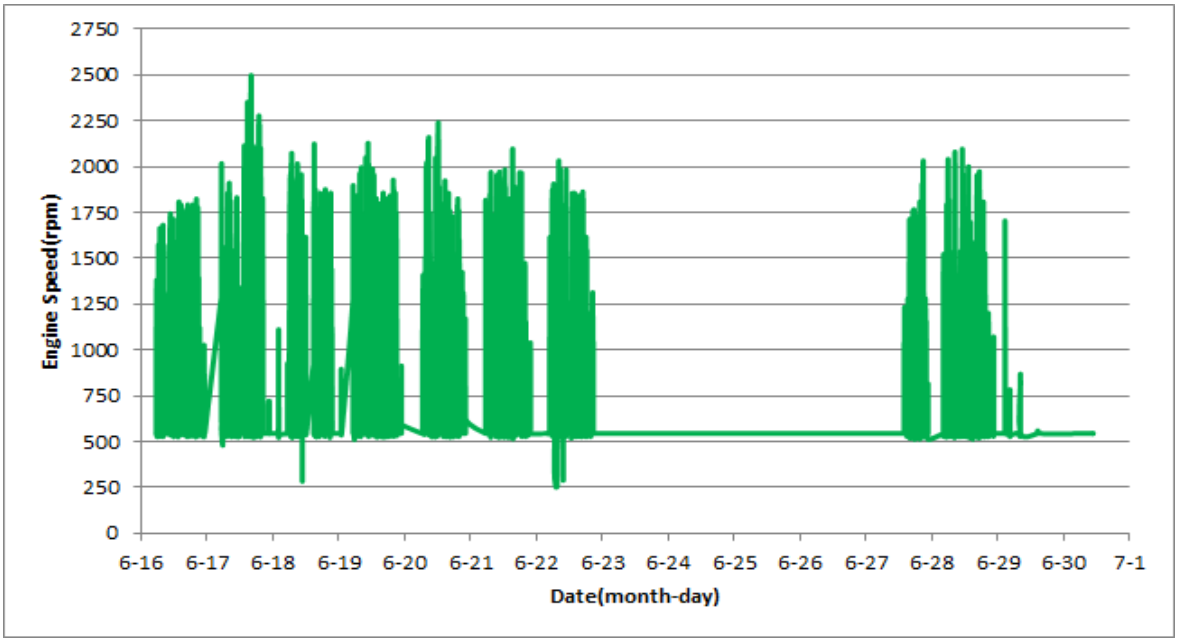


Figure 10- Engine speed distribution over the fifteen days

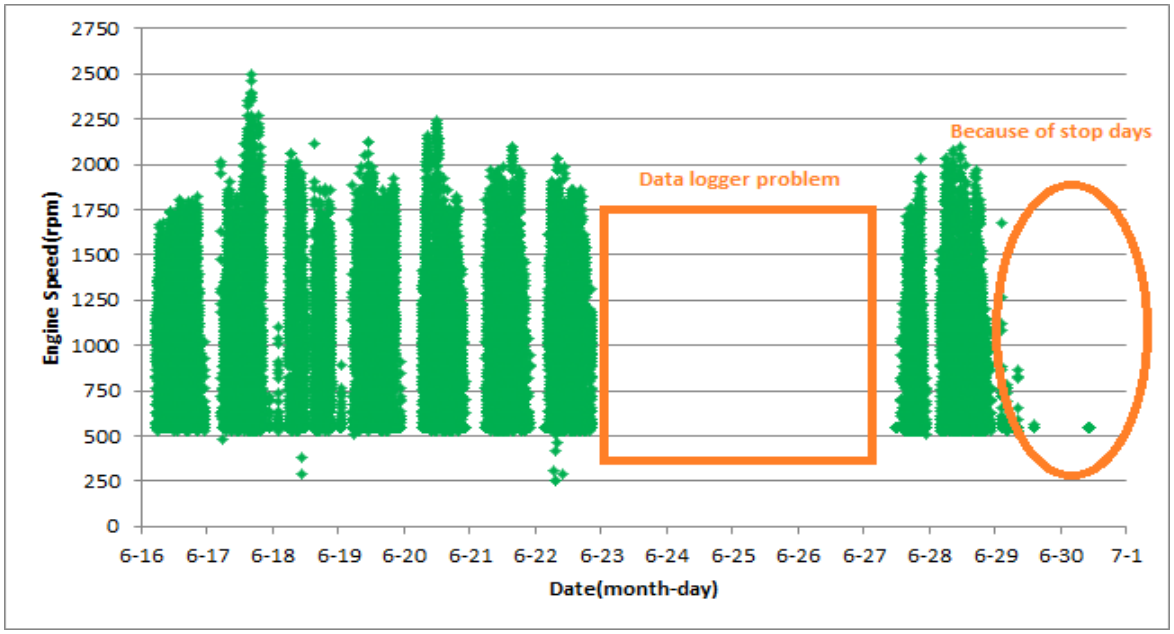


Figure 11- Engine speed diagram for calculating CPK's working days

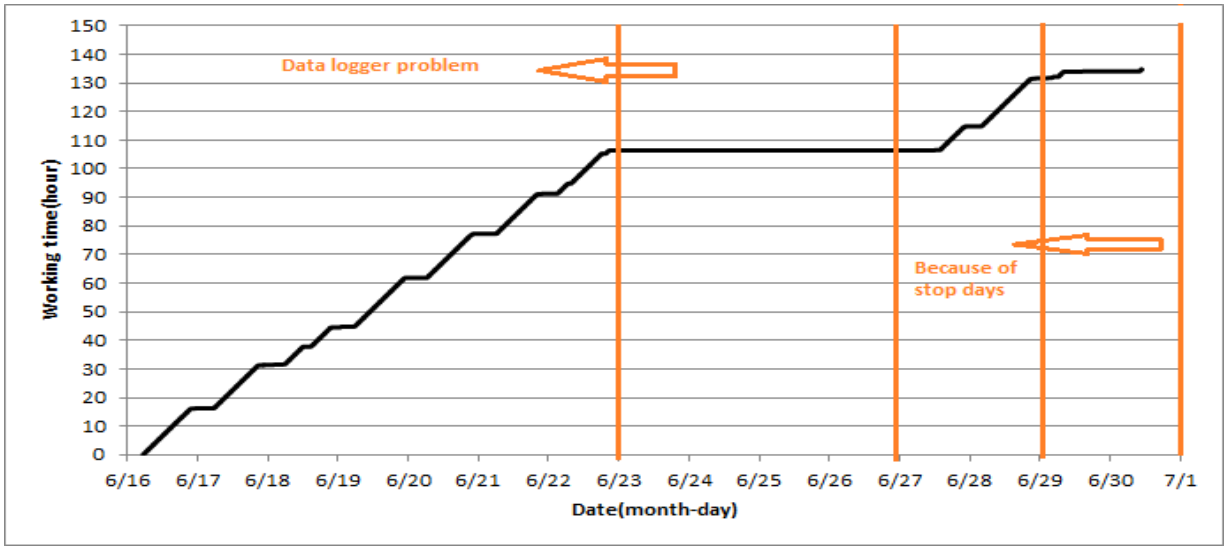


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

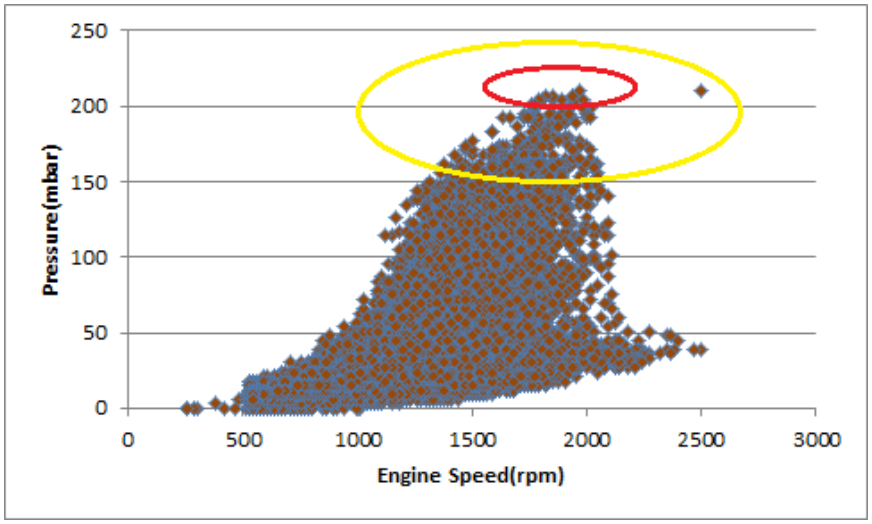


Figure 13- Pressure against engine speed

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

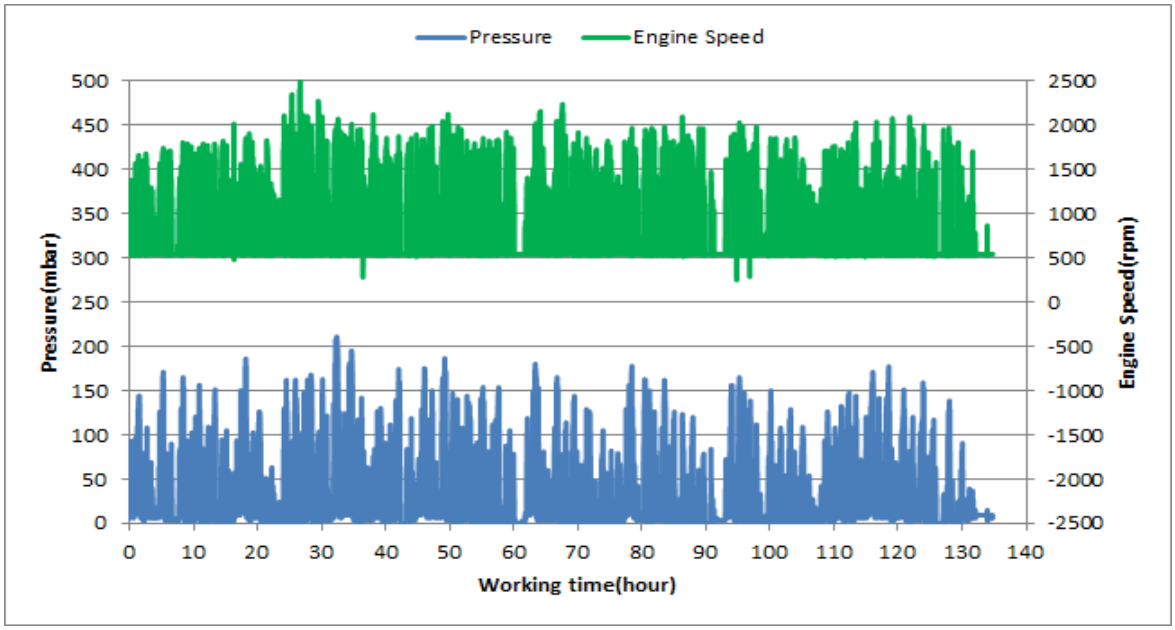


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

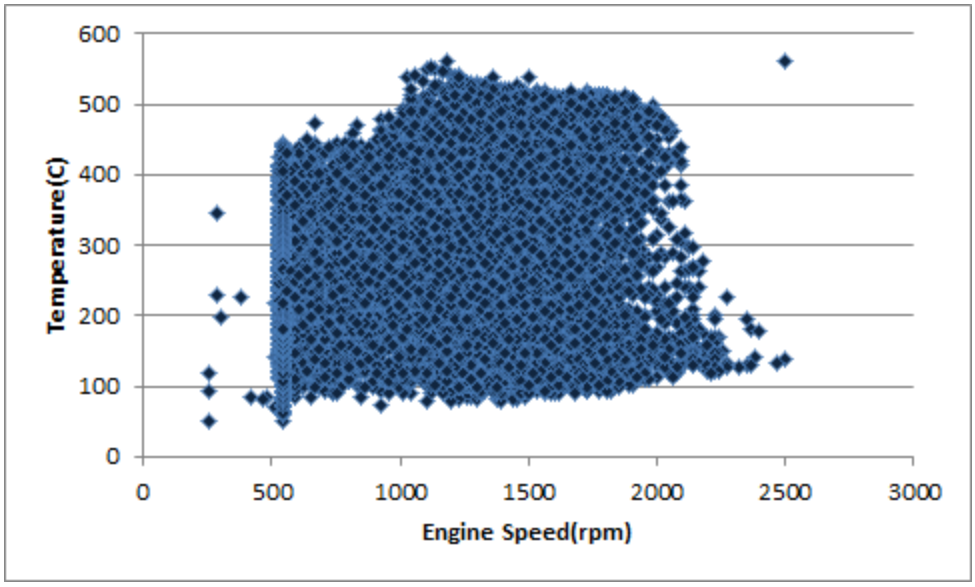


Figure 15- Temperature against engine speed

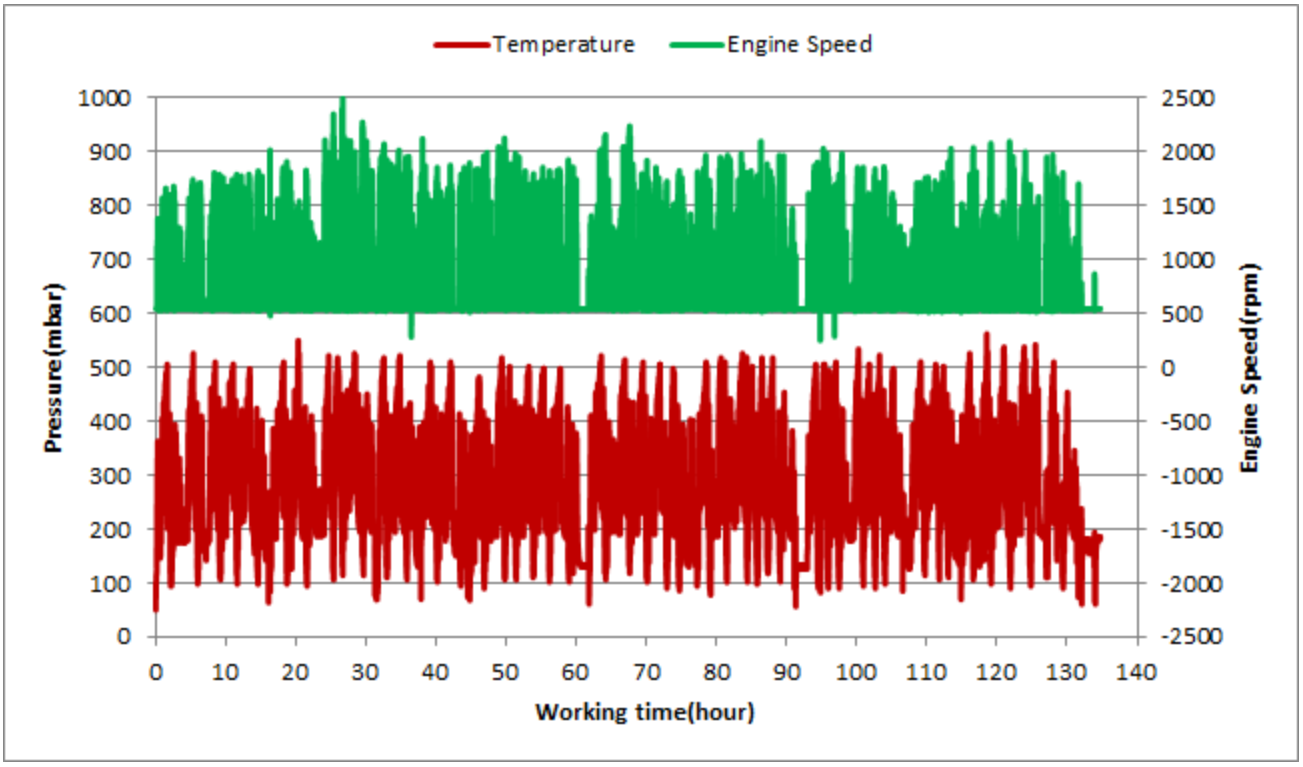


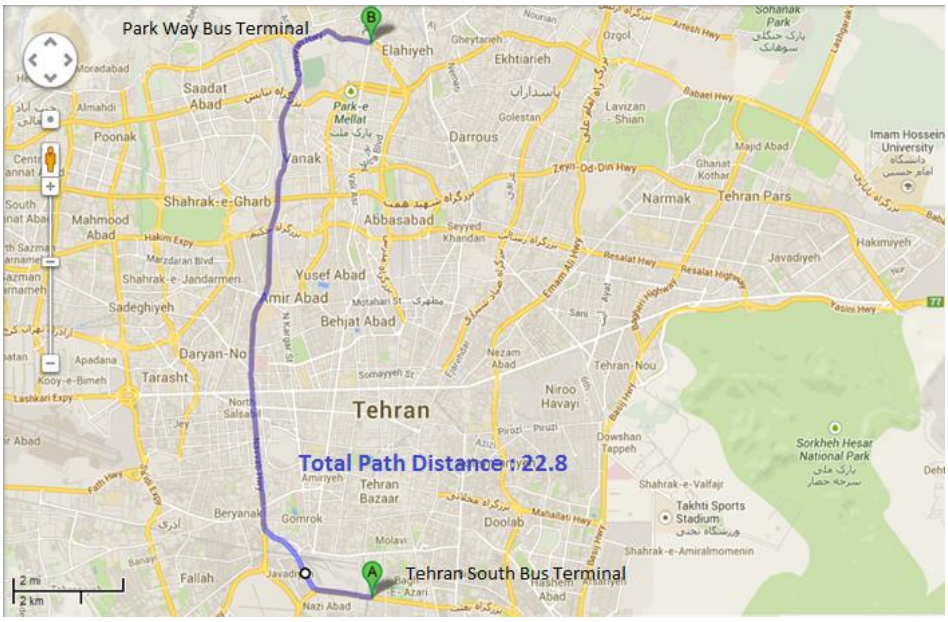
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, 0.04% of total working time pressure is above 200 mbar and only 0.77% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 13% of total working time temperature is above 400 °C and 21% above 350°C.

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: Due to **bus electrical problems** some parts of data were missed. So results during this period, are unreliable.

Overall Information

Table 1- 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	1/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	1.84 $[m^{-1}]$
K value – DPF's downstream	0.05 $[m^{-1}]$

Table 2- Maintenance Table

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)	19088
Bus mileage over the period	2339 km
Working days over the period	-
Stop days	-
Data logger working days	-
Working hours over the period	-
Average working hours per a day (including stop days)	-
Bus average speed	-
Idle speed time to all working time ration	-
Total bus fuel consumption over the period	1640 lit
Fuel consumption per hour	-
Average fuel consumption	0.70 lit/km
Total bus additive consumption over the period	0.85 lit
Average additive consumption	0.364 cc/km
Additive consumption to fuel ration	520 cc per 1000 lit (batch Dosing with Tank Level)

Notice: because of bus electrical problem some information missed.

Temperature, Pressure and Engine Speed Overview

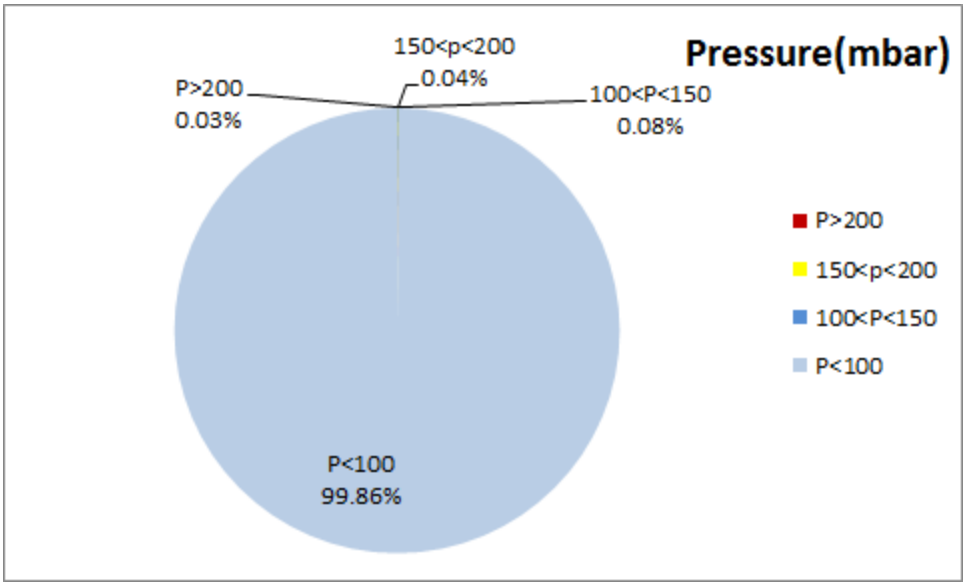


Figure 1- Pressure distribution over the working hours

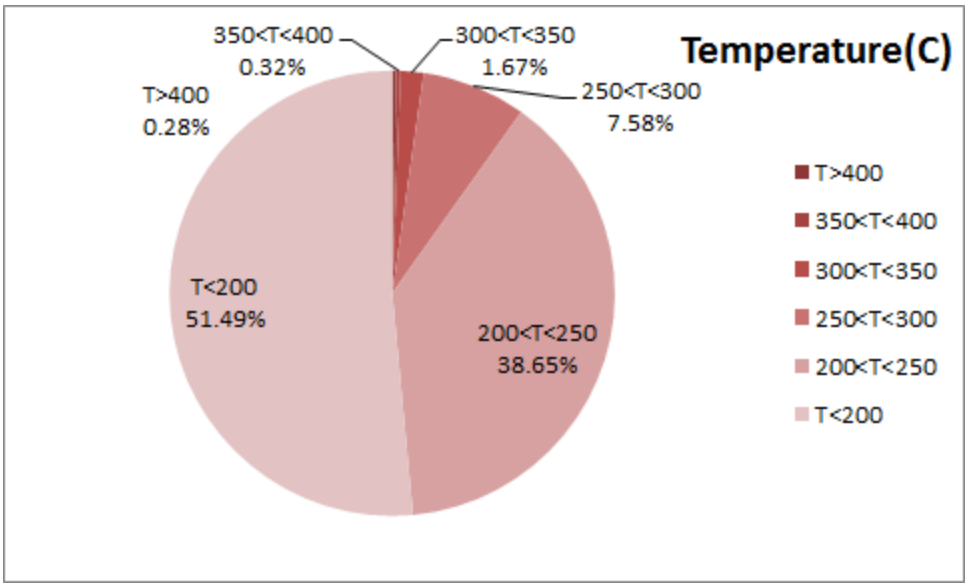


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

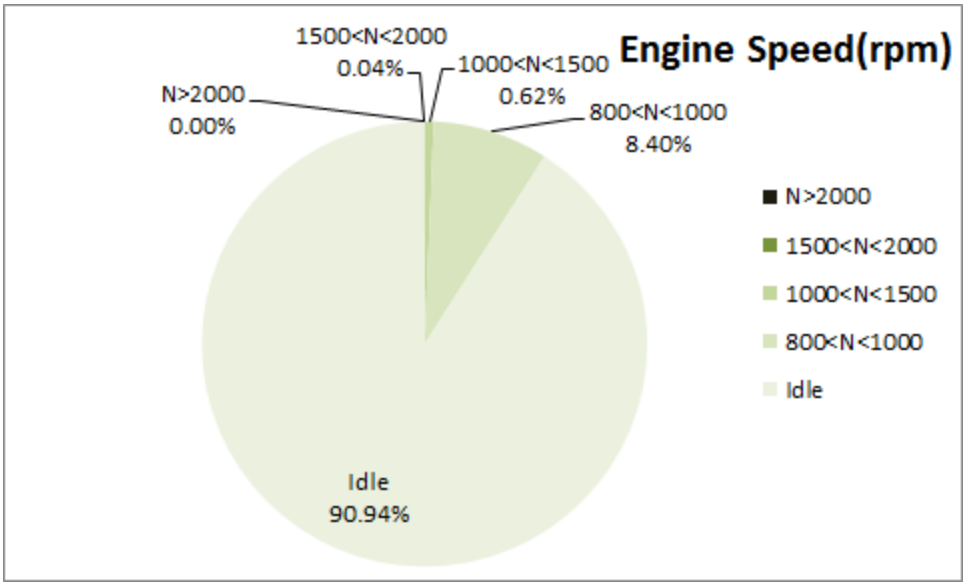


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed. By the way, these figures' results are fully unreliable due to bus electrical problem.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
189.08	17.19	685

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
224.76	22.08	836

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
578-50	243-0	1966-251

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

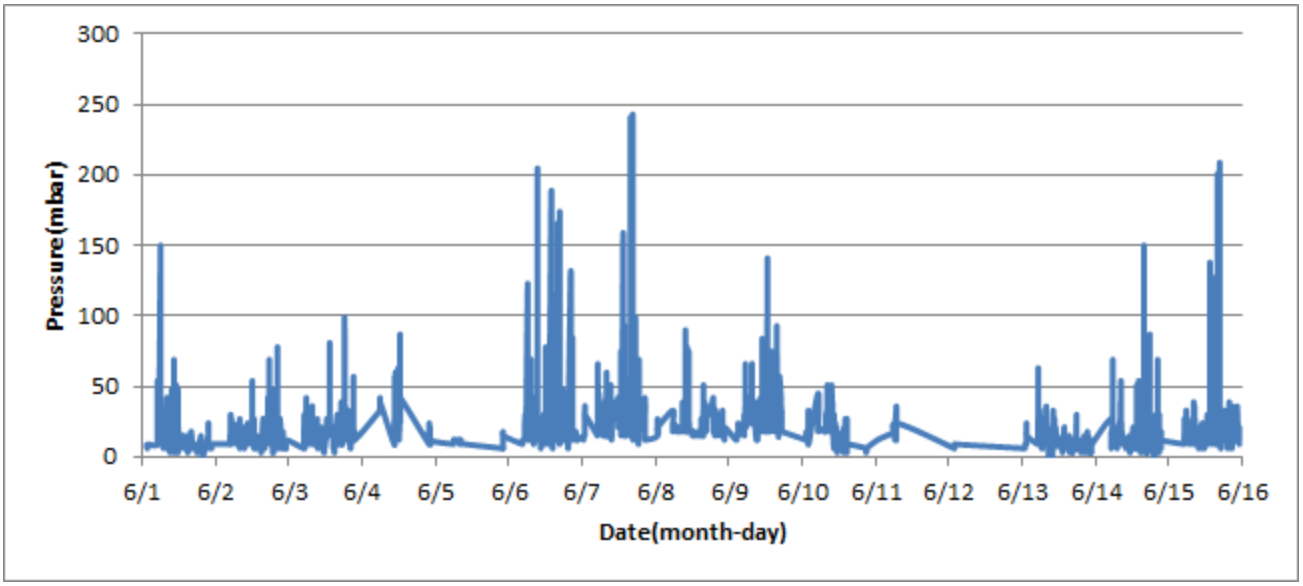


Figure 4- Pressure distribution over the fifteen days

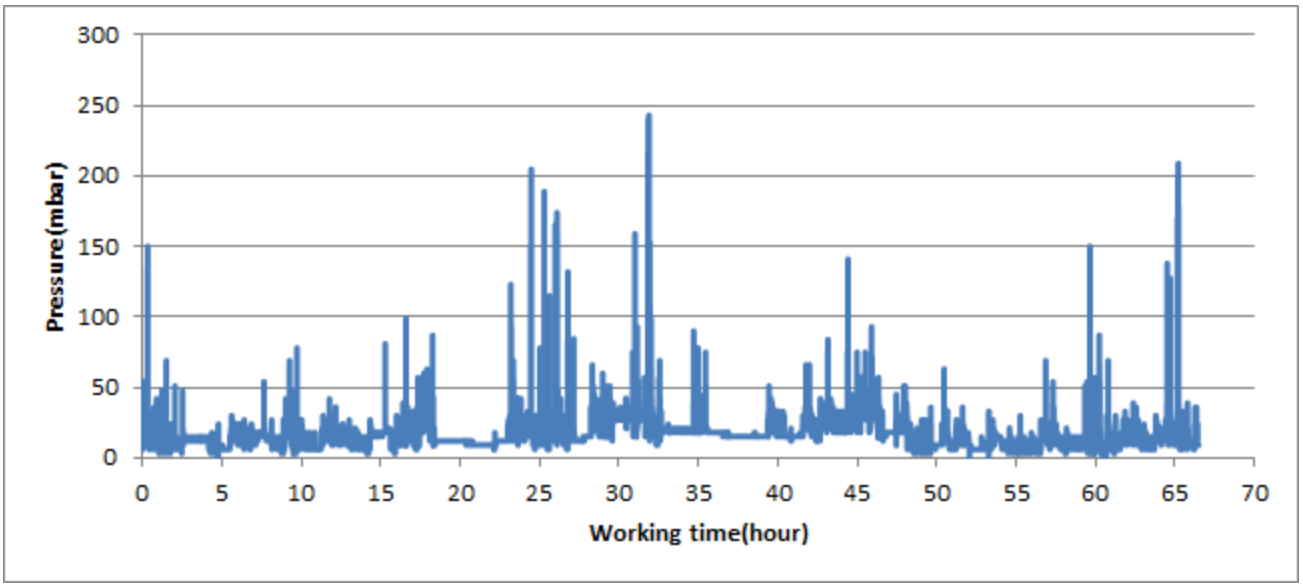


Figure 5- Pressure vs. working hours

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

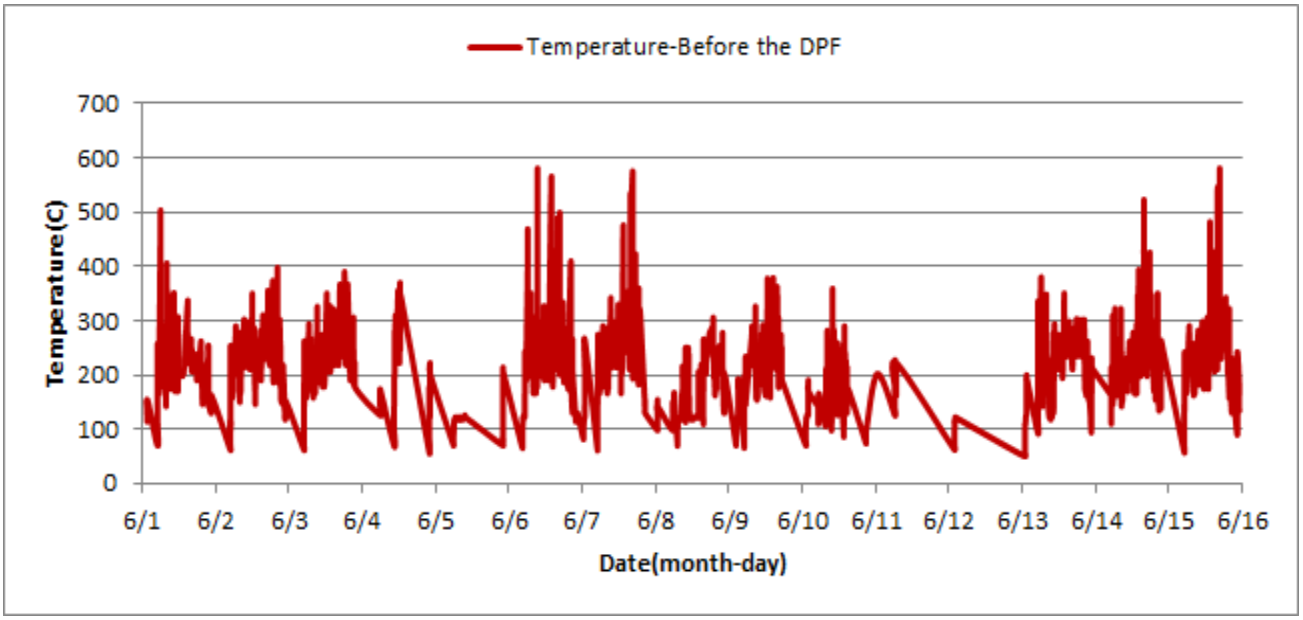


Figure 6- Temperature distribution over the fifteen days

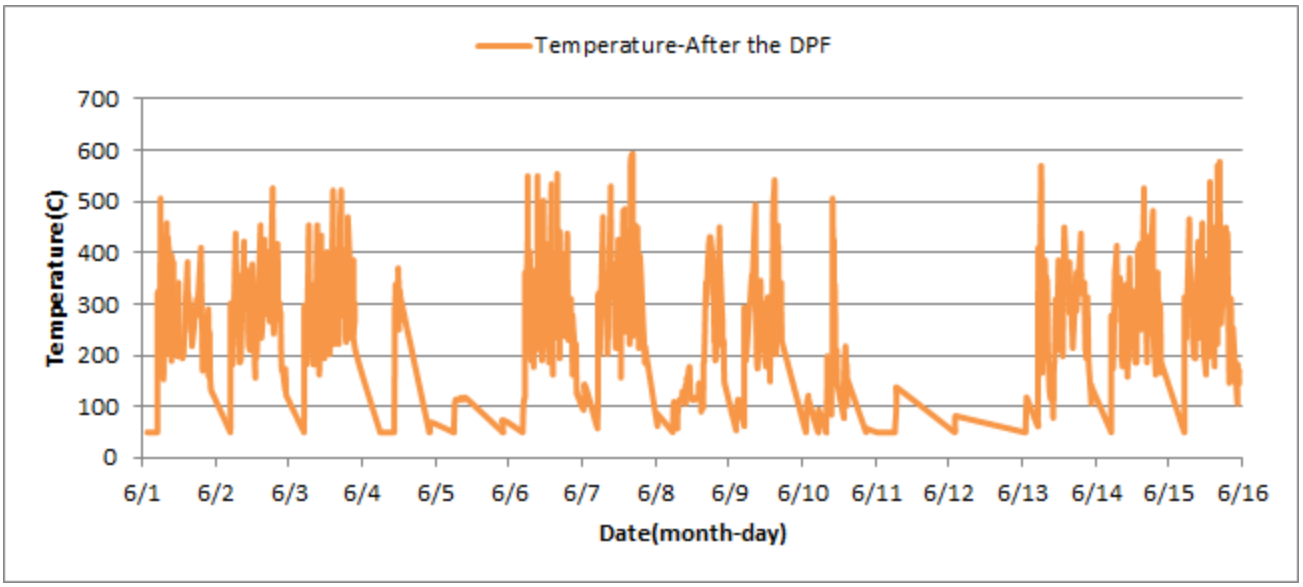


Figure 7- Temperature distribution over the fifteen days

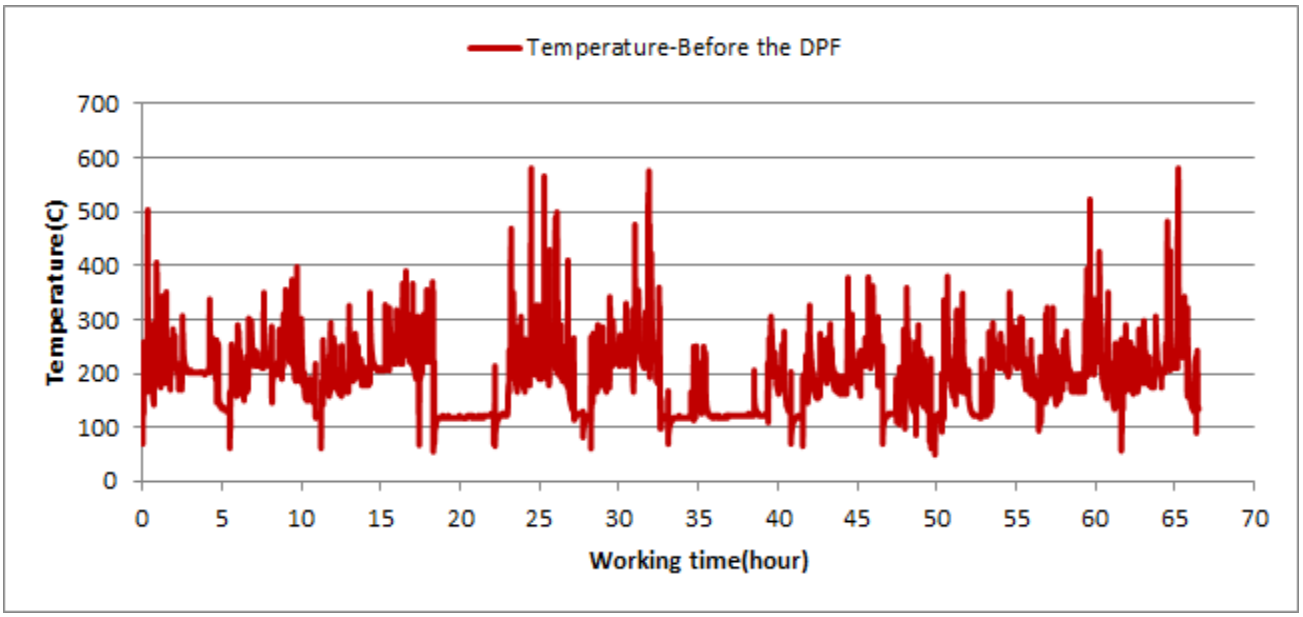


Figure 8- Temperature vs. working hours

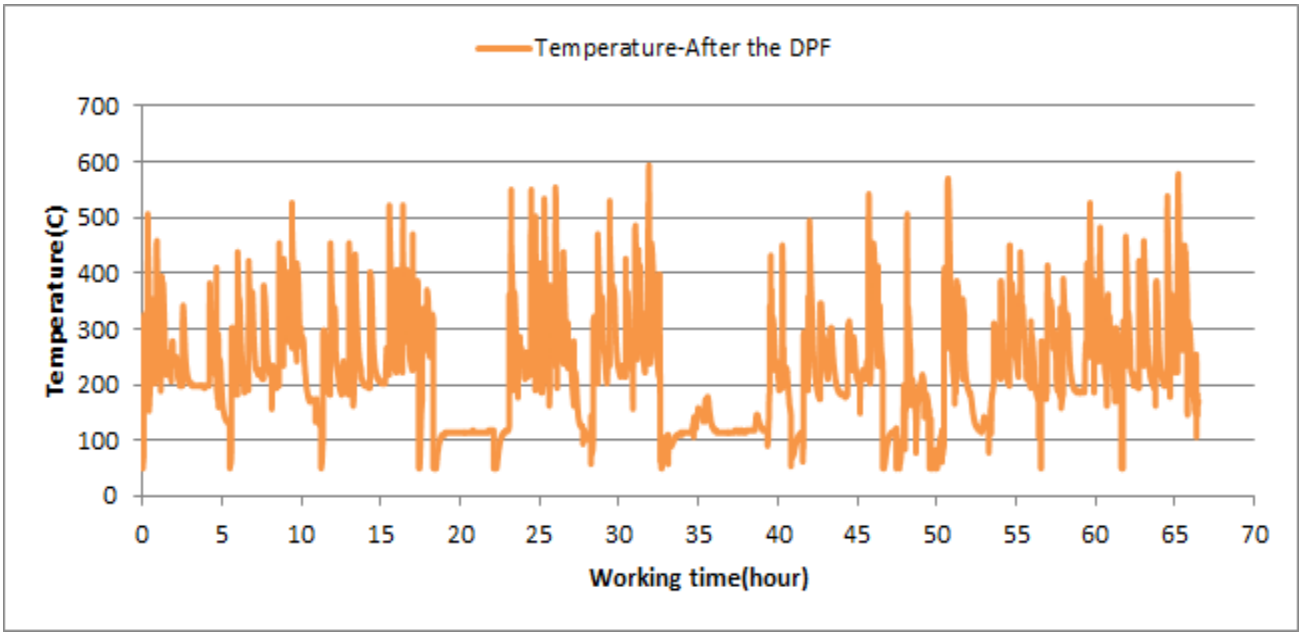


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

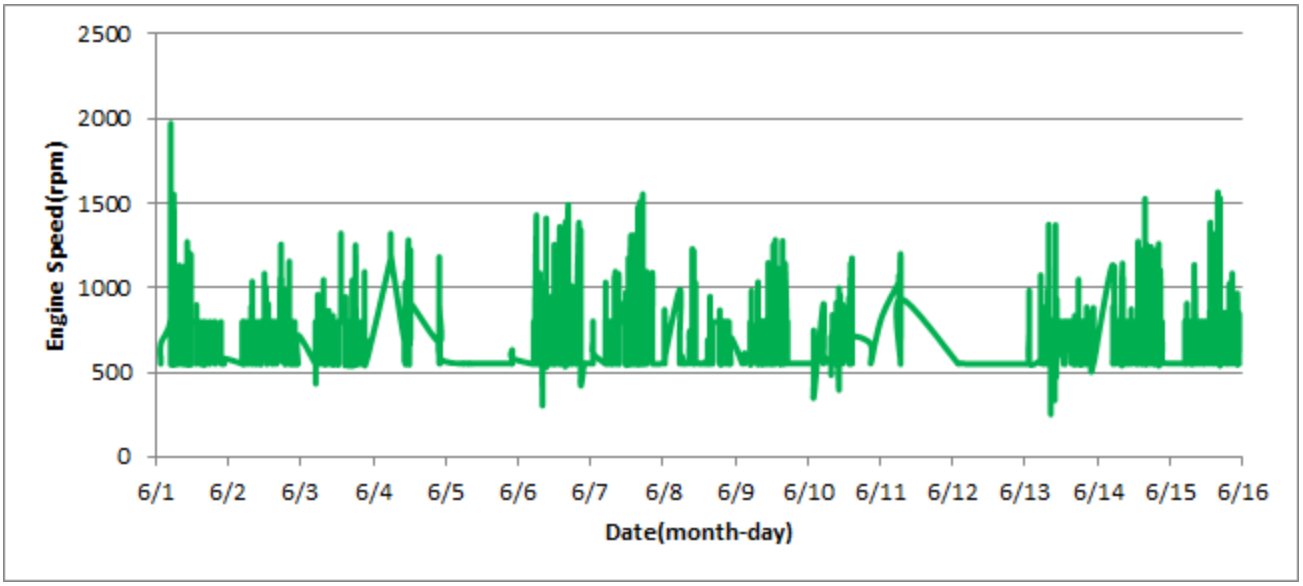


Figure 10- Engine speed distribution over the fifteen days

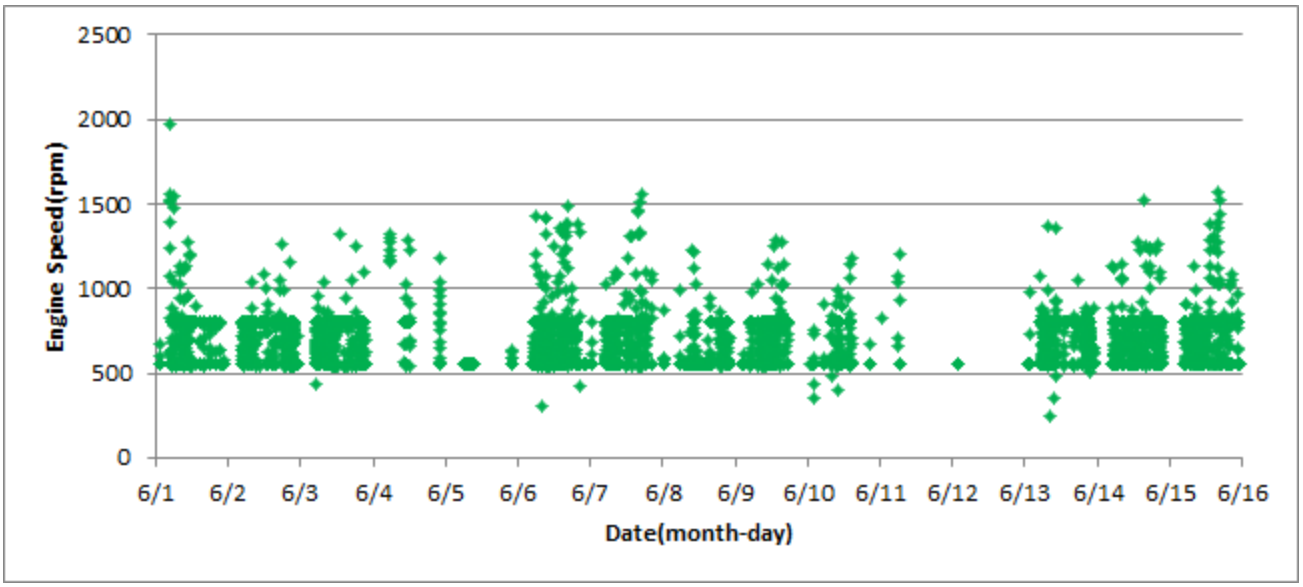


Figure 11- Engine speed diagram for calculating CPK's working days

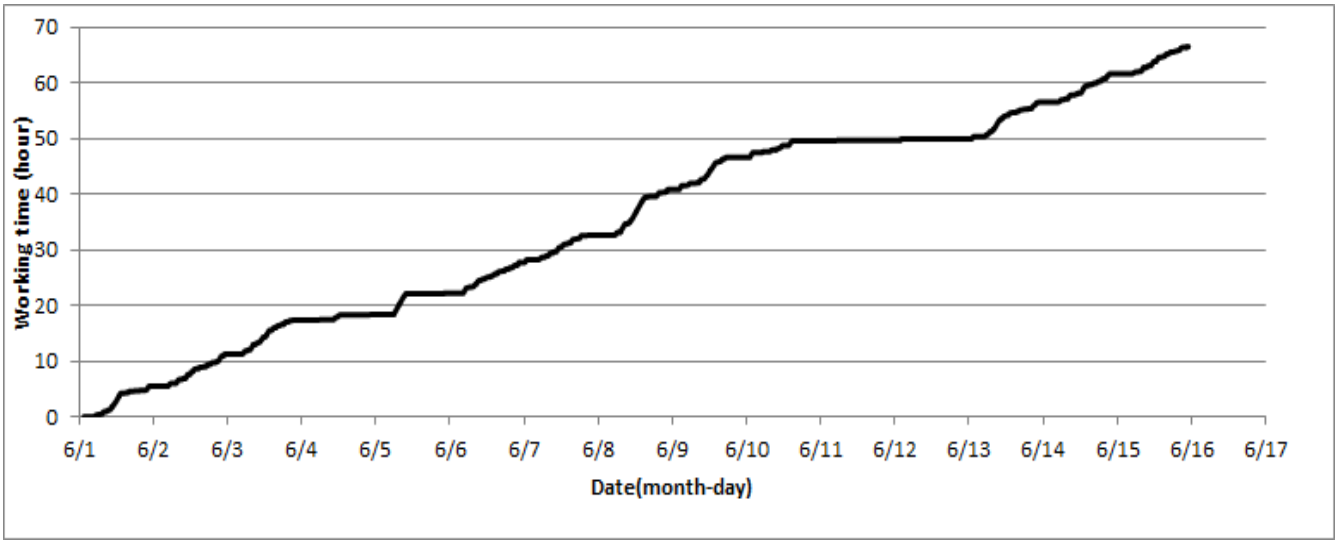


Figure 12- Time diagram for calculating CPK's working days

Notice: As was mentioned above, some data was missed due to technical problems. So working days can't be obtained from this diagram.

Pressure-Engine Speed diagrams

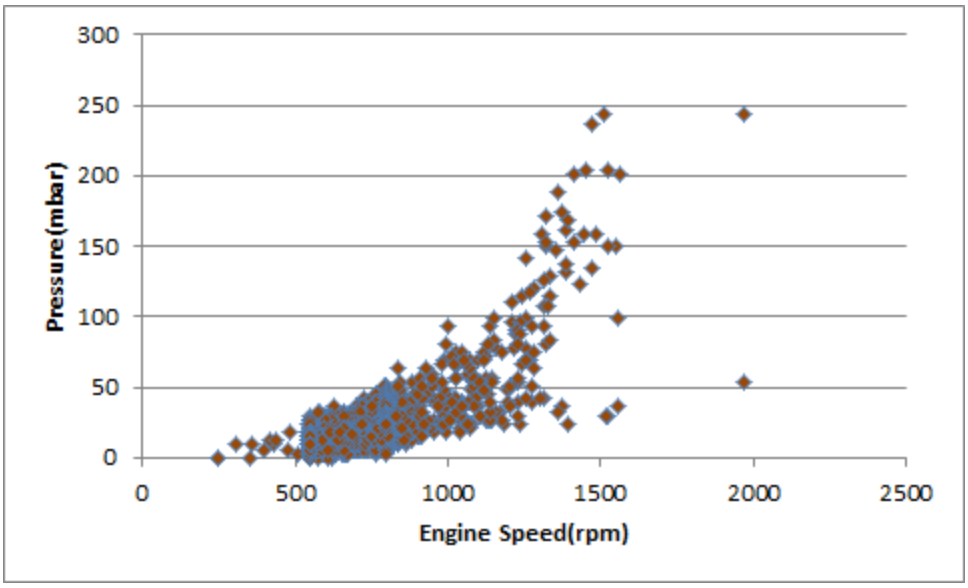


Figure 13- Pressure against engine speed

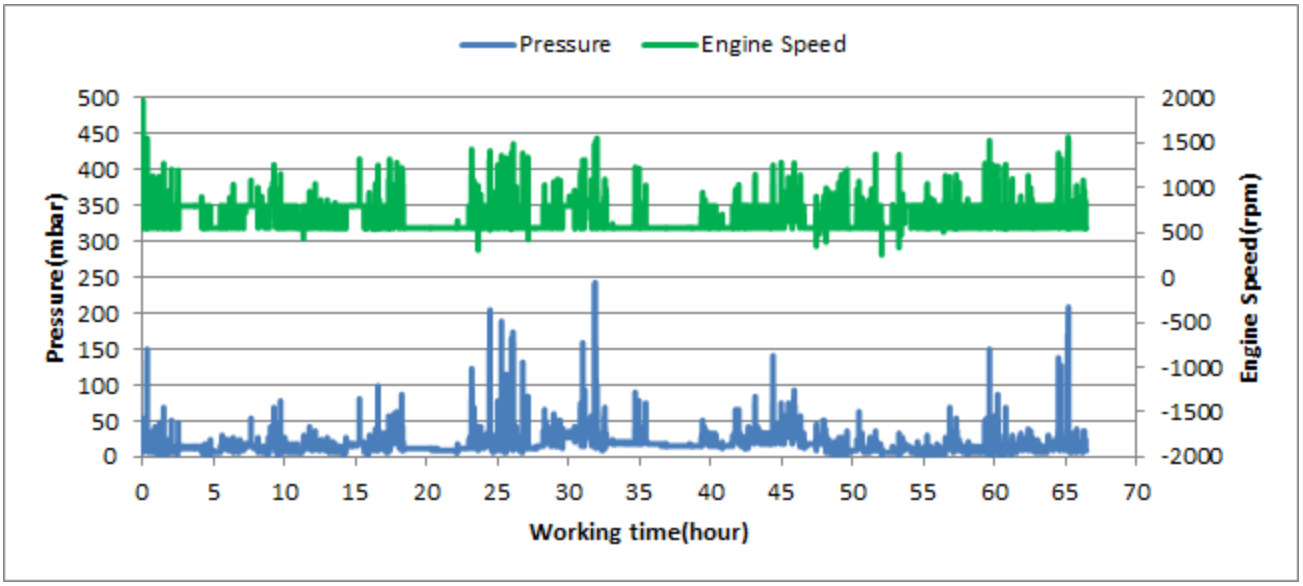


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

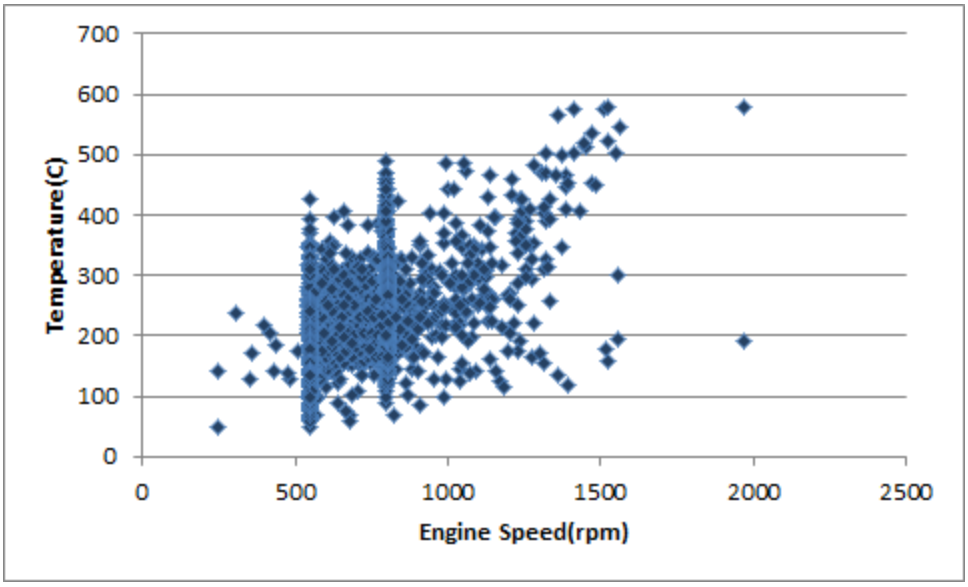


Figure 15- Temperature against engine speed

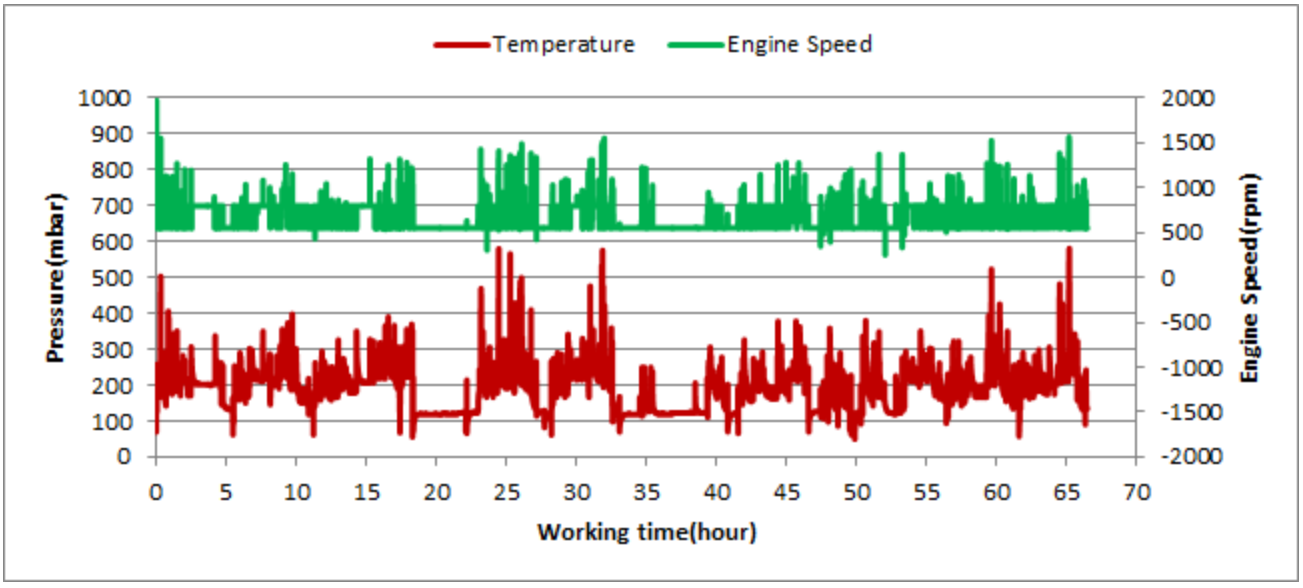


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- Reliable conclusion about filter operation can't be obtained from this report due to **bus electrical problem**.

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

Notice: Due to **bus electrical problems** some parts of data were missed. So results during this period, are unreliable.

Overall Information

Table 1- 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/Jun/2015 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	1.84$[m^{-1}]$
K value – DPF's downstream	0.05 $[m^{-1}]$

Table 2- Maintenance Table

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)	20697 km
Bus mileage over the period	1609 km
Working days over the period	-
Stop days	-
Data logger working days	-
Working hours over the period	-
Average working hours per a day (including stop days)	-
Bus average speed	-
Idle speed time to all working time ration	-
Total bus fuel consumption over the period	1044 lit
Fuel consumption per hour	-
Average fuel consumption	0.64 lit/km
Total bus additive consumption over the period	0.53 lit
Average additive consumption	0.329 cc/km
Additive consumption to fuel ration	507 cc per 1000 lit (batch dosing with tank level)

Notice: because of bus electrical problem some information missed.

Temperature, Pressure and Engine Speed Overview

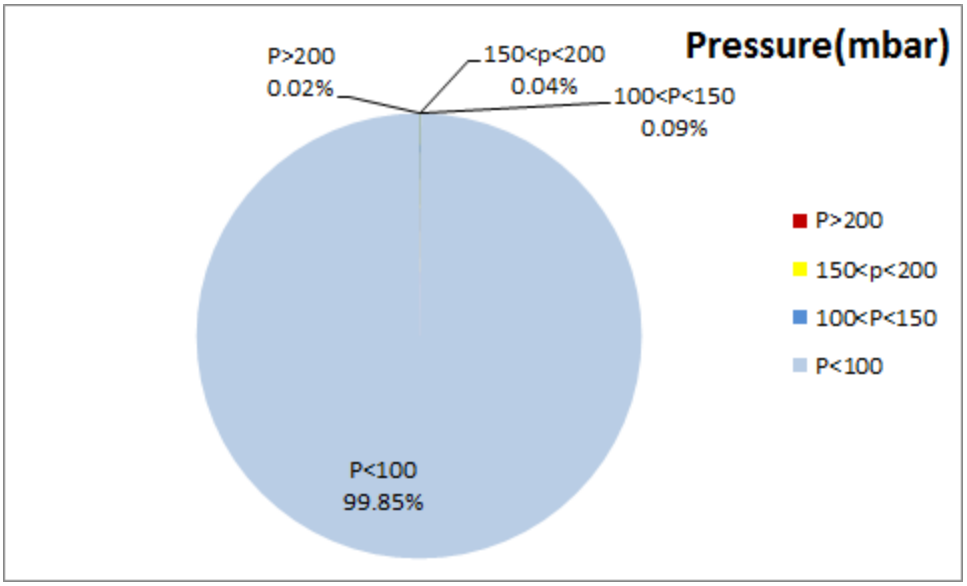


Figure 1- Pressure distribution over the working hours

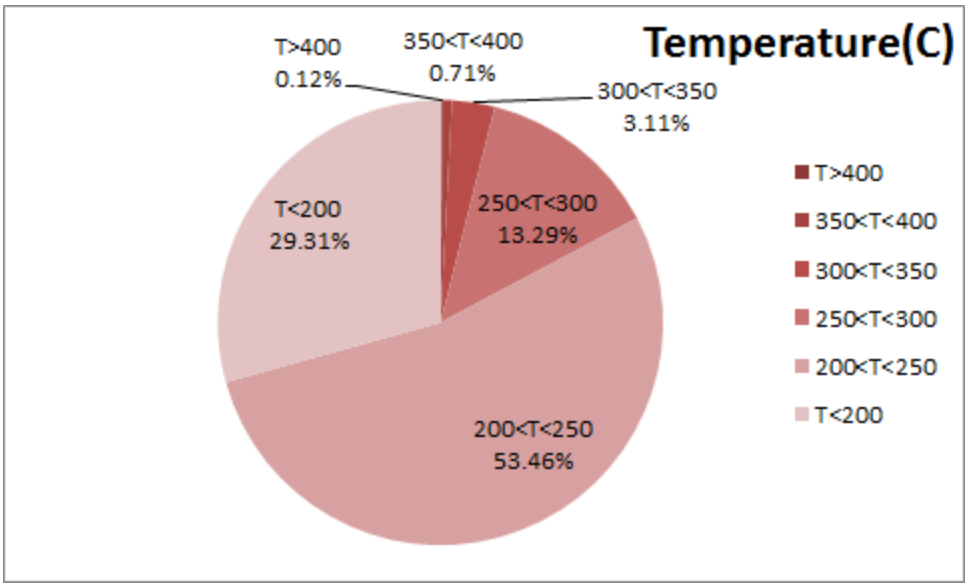


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

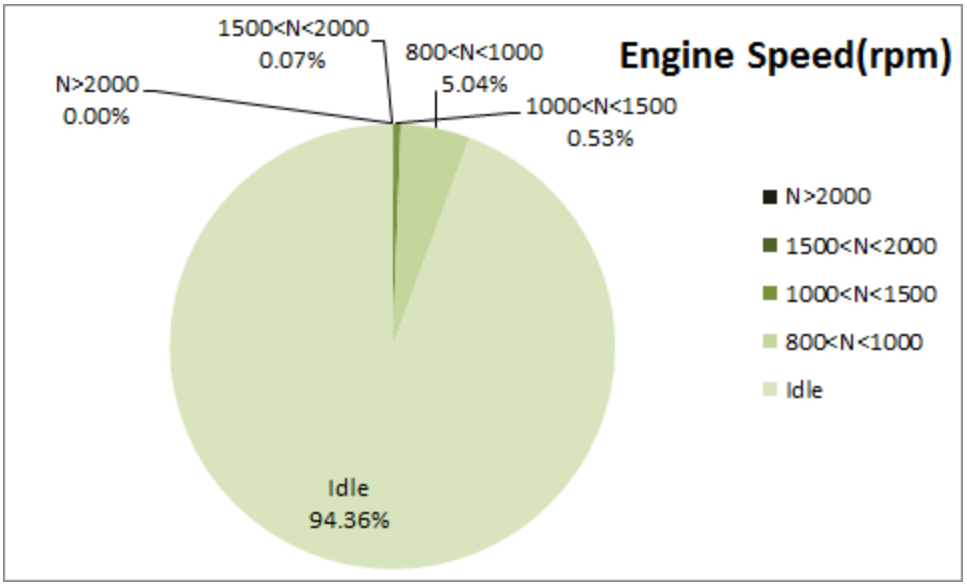


Figure 3- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed. By the way, these figures' results are fully unreliable due to bus electrical problem.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
219.72	28.96	732

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
234.58	35.86	860

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
582-54	240-6	1995-318

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

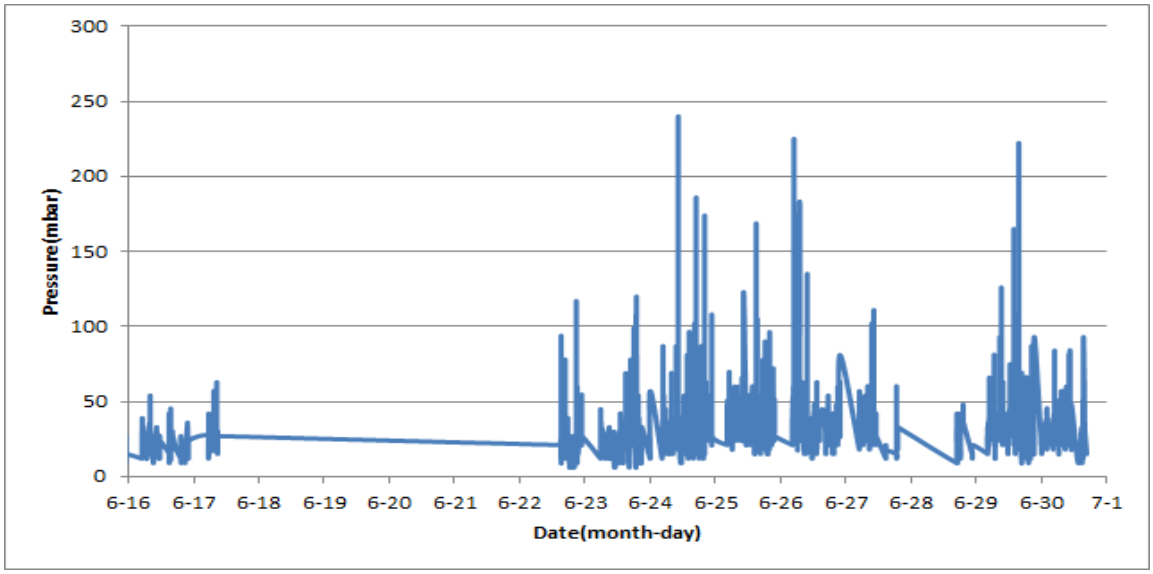


Figure 4- Pressure distribution over the fifteen days

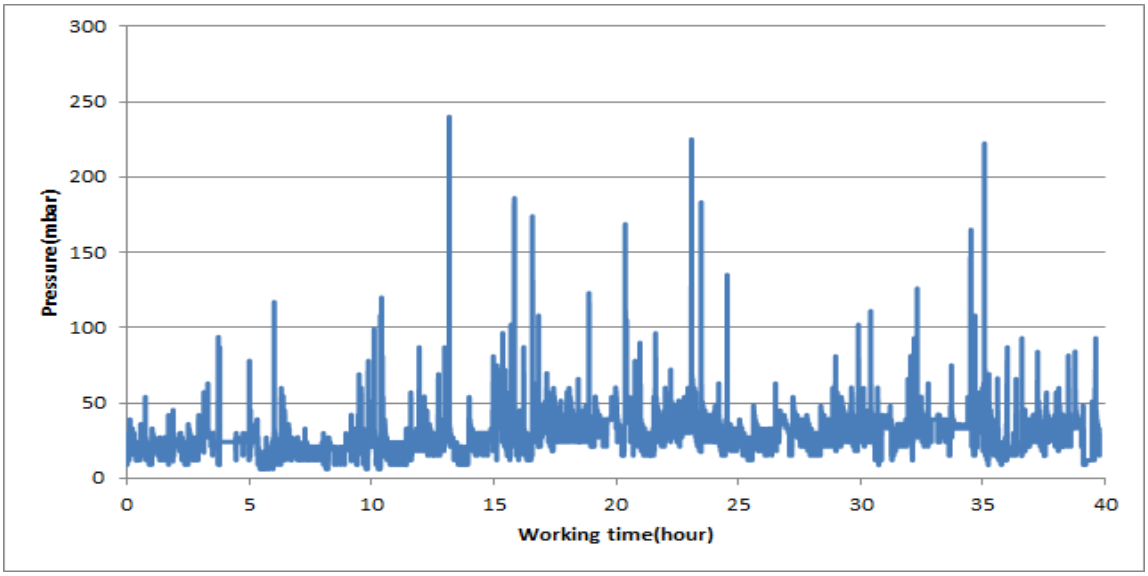


Figure 5- Pressure vs. working hours

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

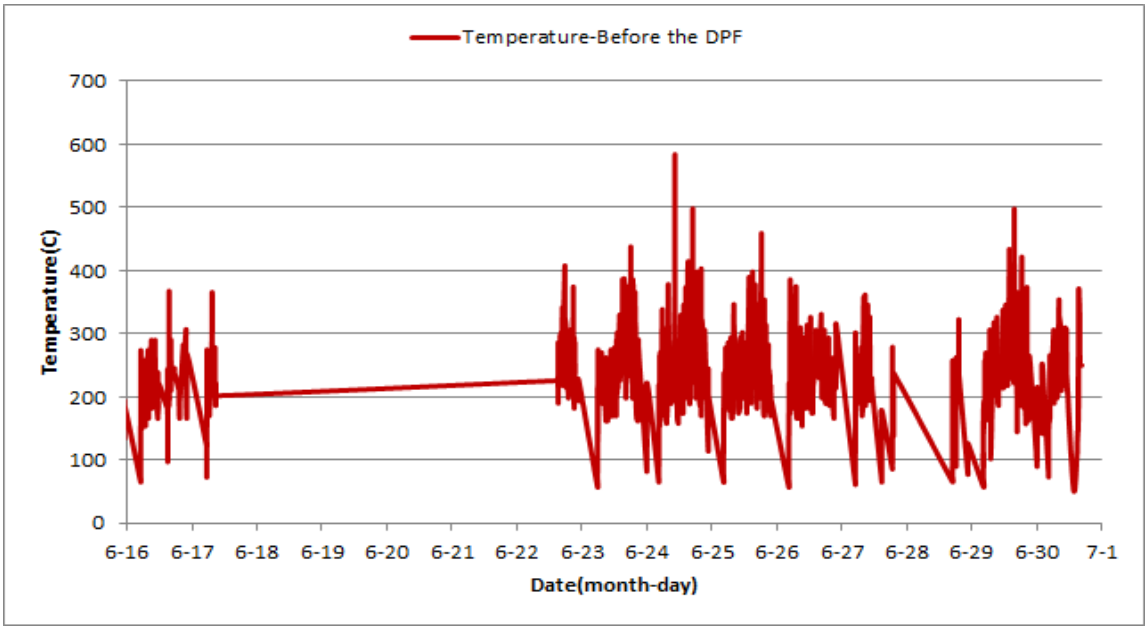


Figure 6- Temperature distribution over the fifteen days

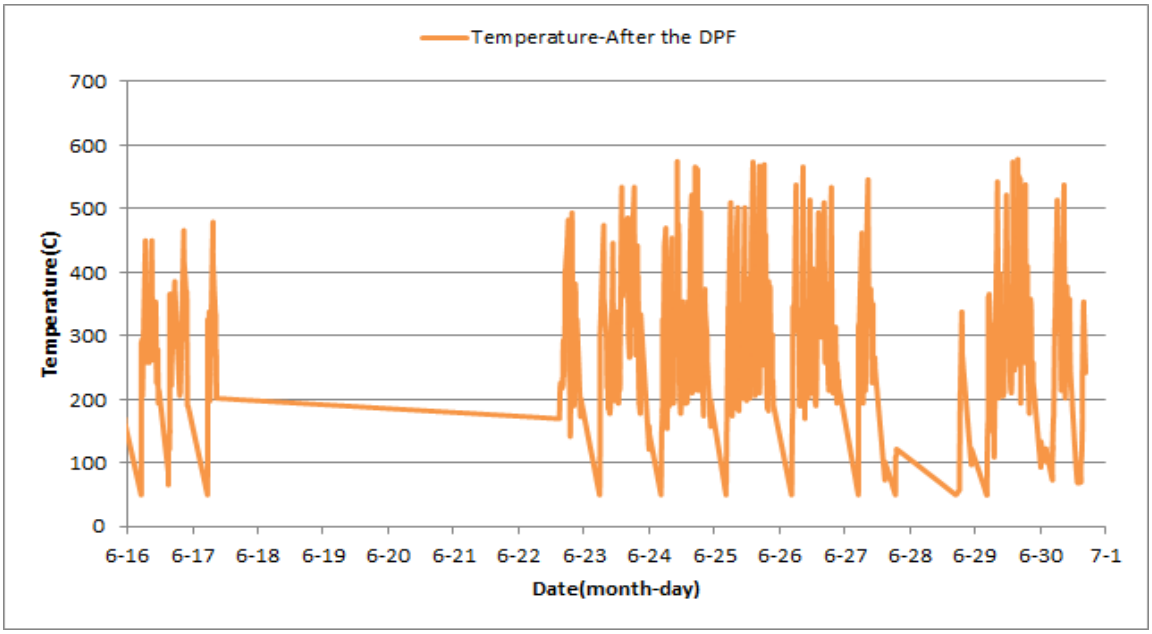


Figure 7- Temperature distribution over the fifteen days

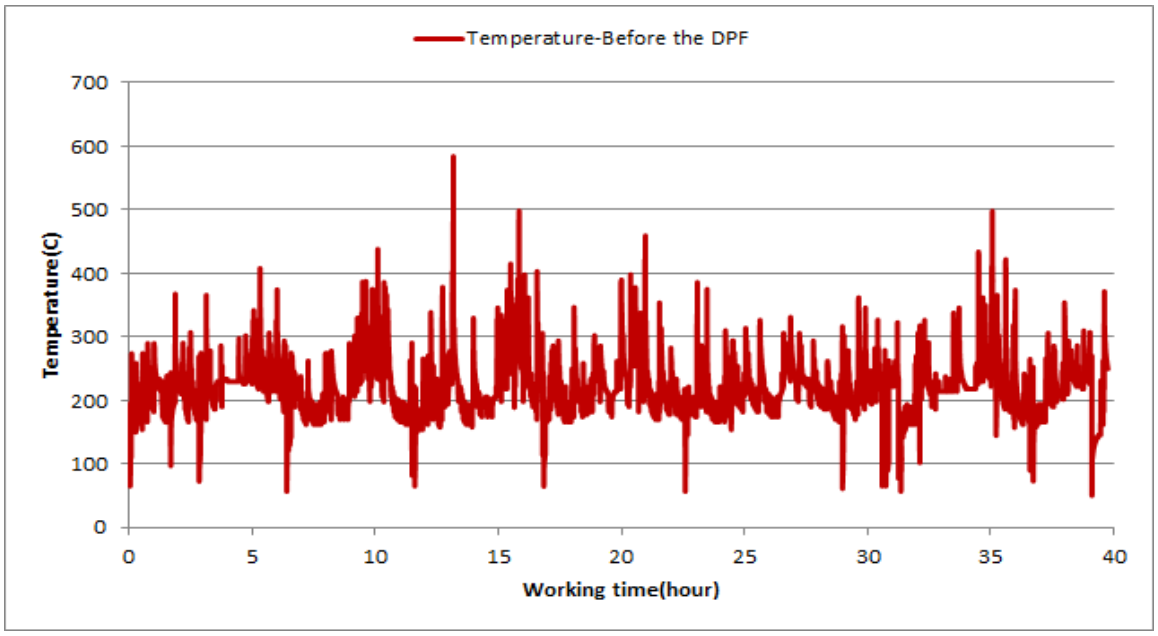


Figure 8- Temperature vs. working hours

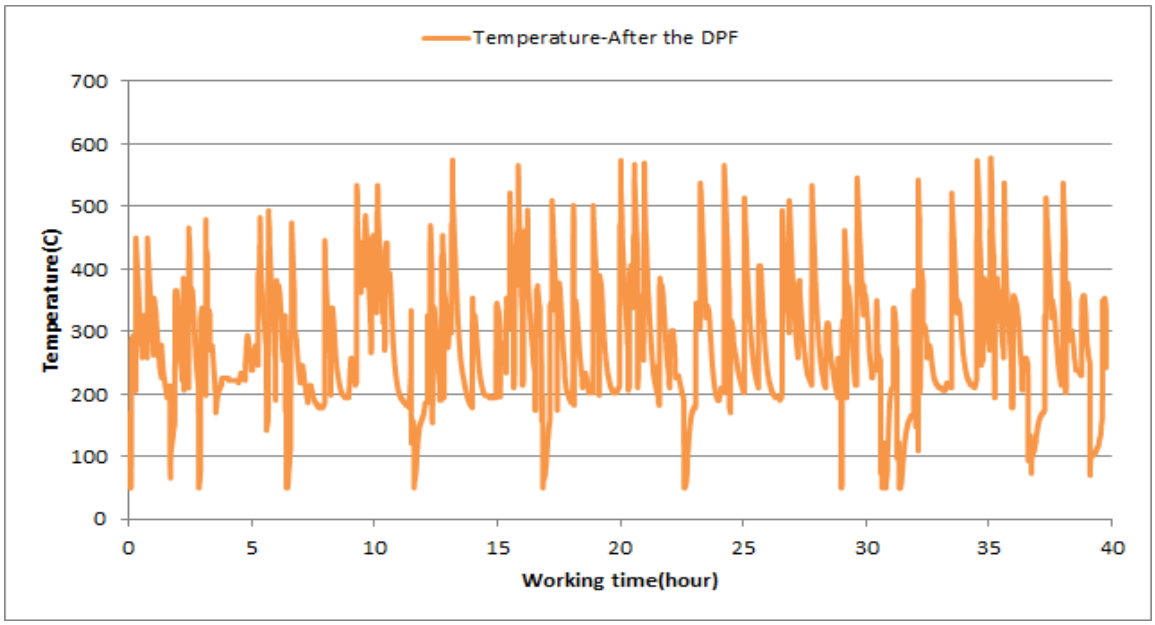


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

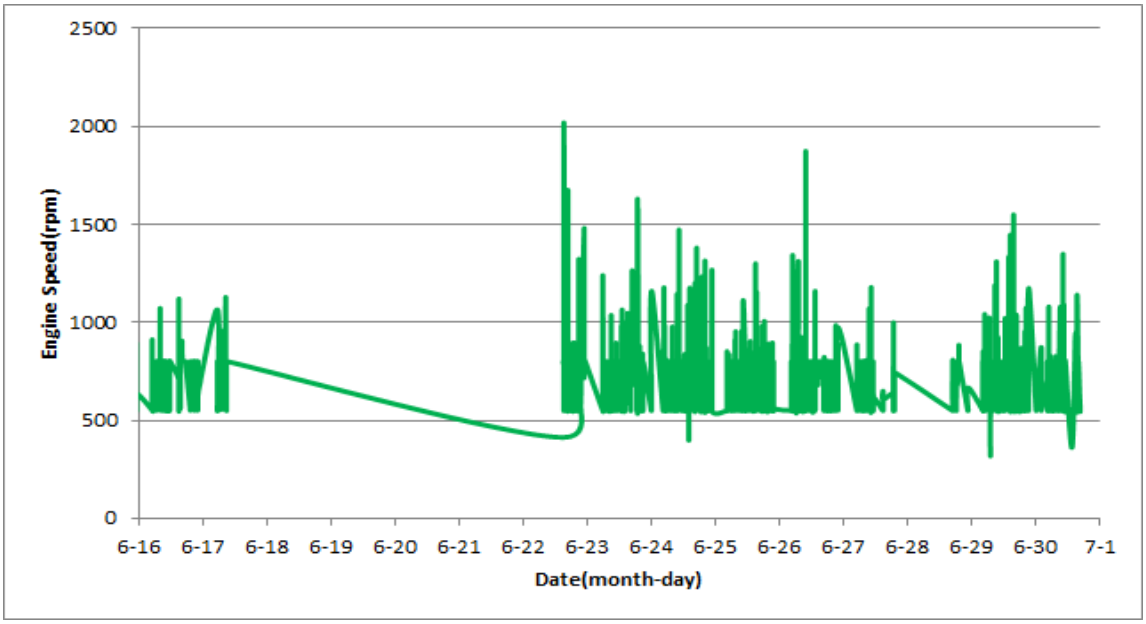


Figure 10- Engine speed distribution over the fifteen days

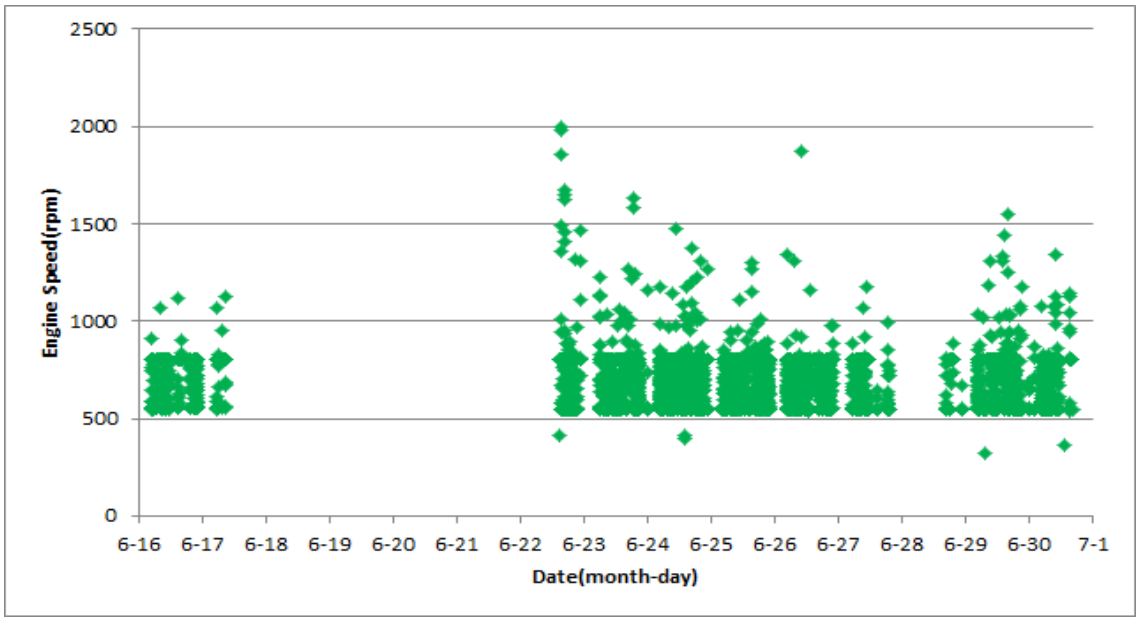


Figure 11- Engine speed diagram for calculating CPK's working days

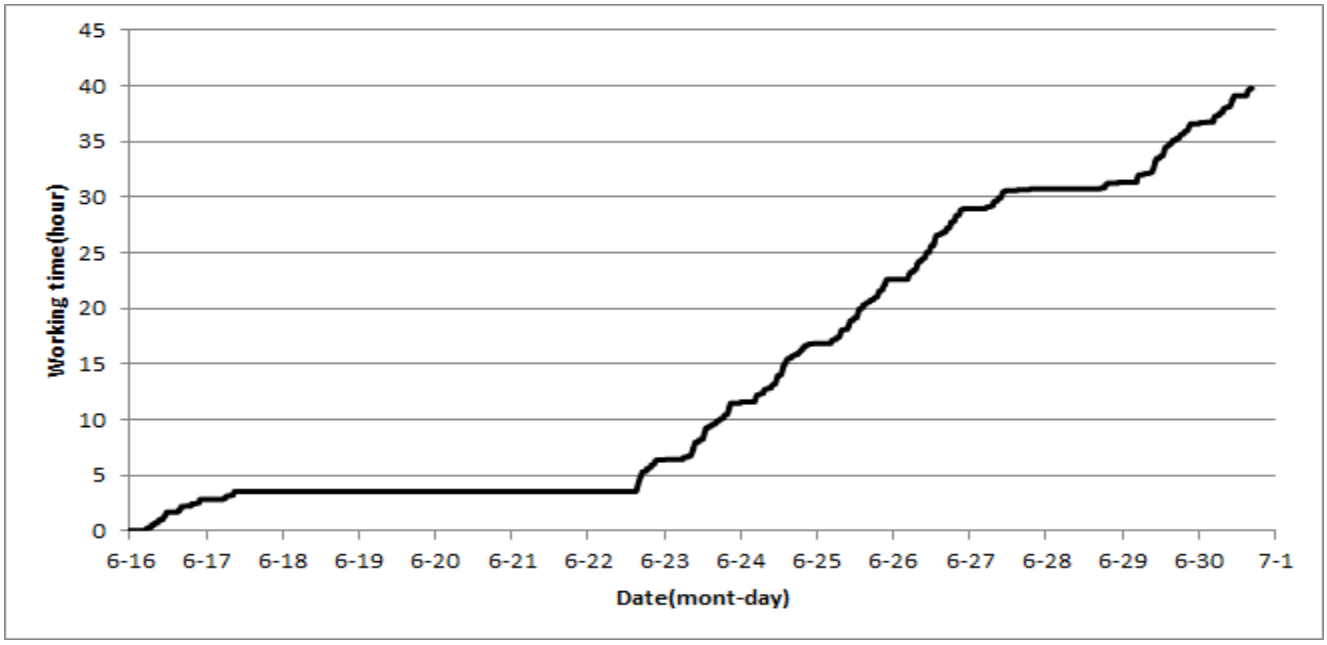


Figure 12- Time diagram for calculating CPK's working days

Notice: As was mentioned above, some data missed due to technical problems. So working days can't be obtained from this diagram.

Pressure-Engine Speed diagrams

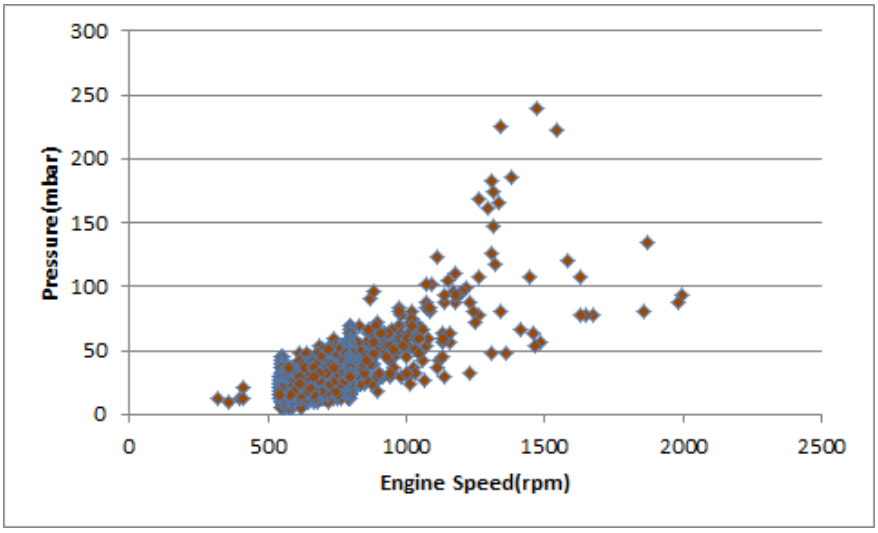


Figure 13- Pressure against engine speed

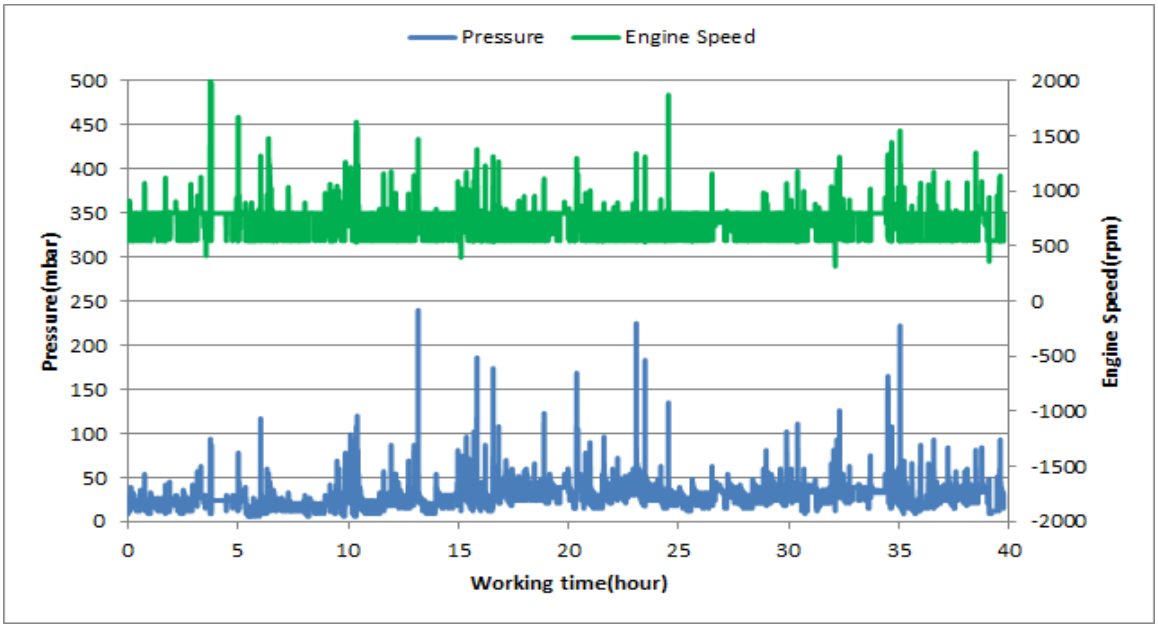


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

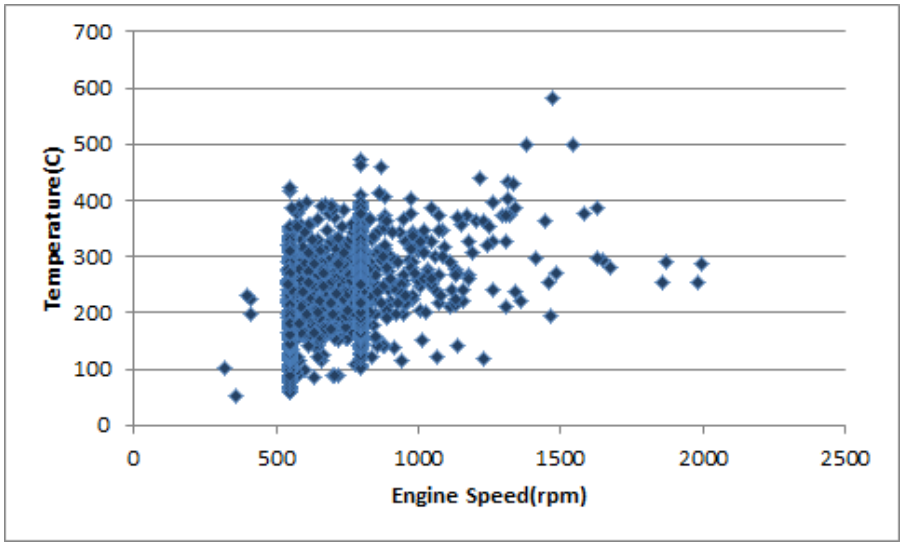


Figure 15- Temperature against engine speed

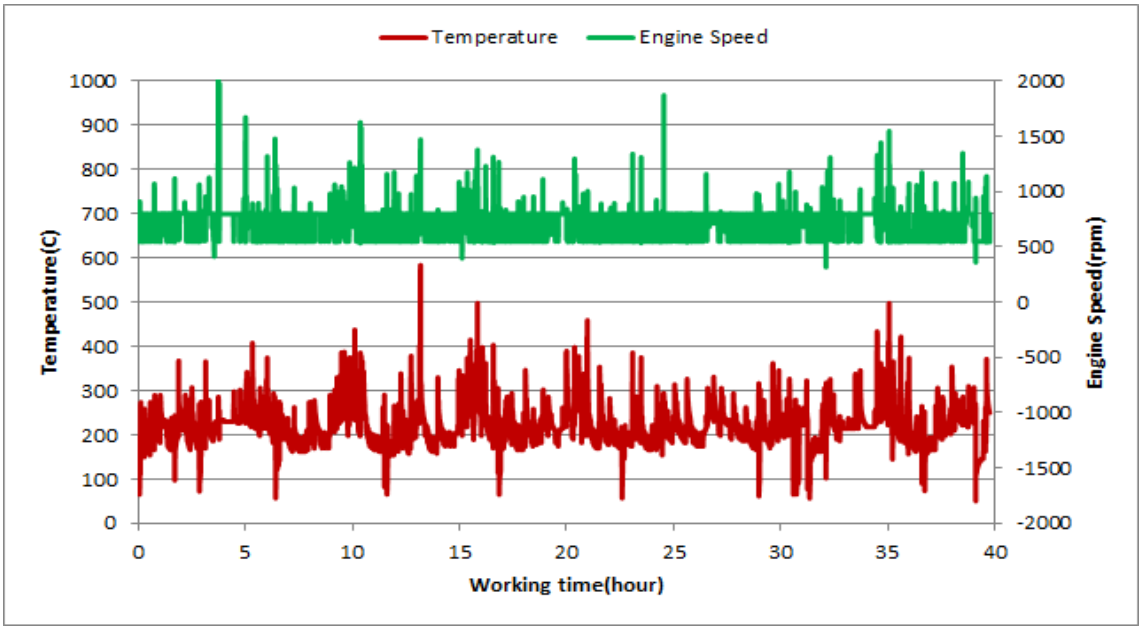


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- Reliable conclusion about filter operation can't be obtained from this report due to **bus electrical problem**.

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)

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	1/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	1.71 $[m^{-1}]$
K value – DPF's downstream	0.08 $[m^{-1}]$

Table 2- Maintenance Table

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)	16293 km
Bus mileage over the period	2013 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	199 hours, 37 minutes
Average working hours per a day (including stop days)	13 hours, 19 minutes
Bus average speed	10.08 km/hr
Idle speed time to all working time ration	54%
Total bus fuel consumption over the period	1274 lit
Fuel consumption per hour	6.38 lit/hr
Average fuel consumption	0.63 lit/km
Total bus additive consumption over the period	0.522 lit
Average additive consumption	0.259 cc/km
Additive consumption to fuel ration	410 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

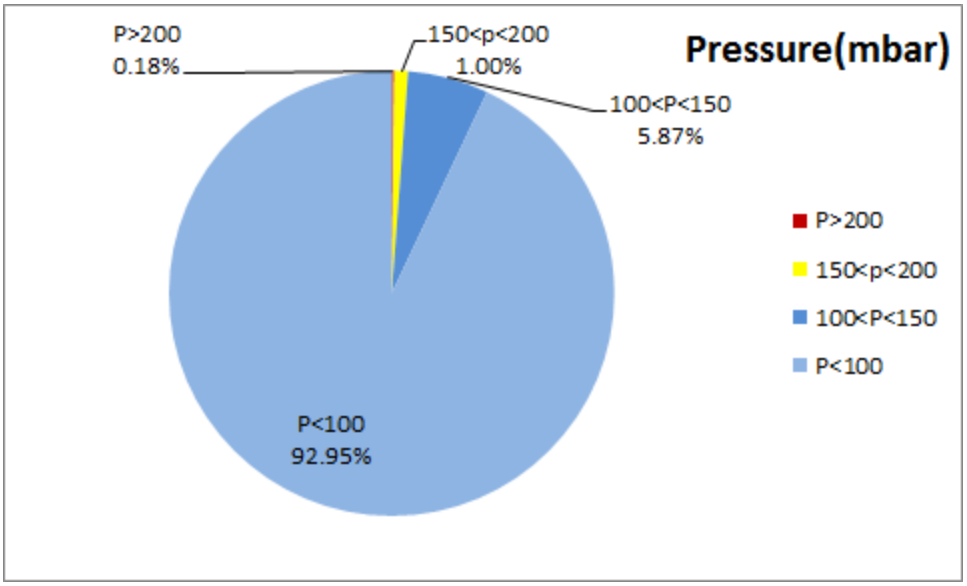


Figure 1- Pressure distribution over the working hours

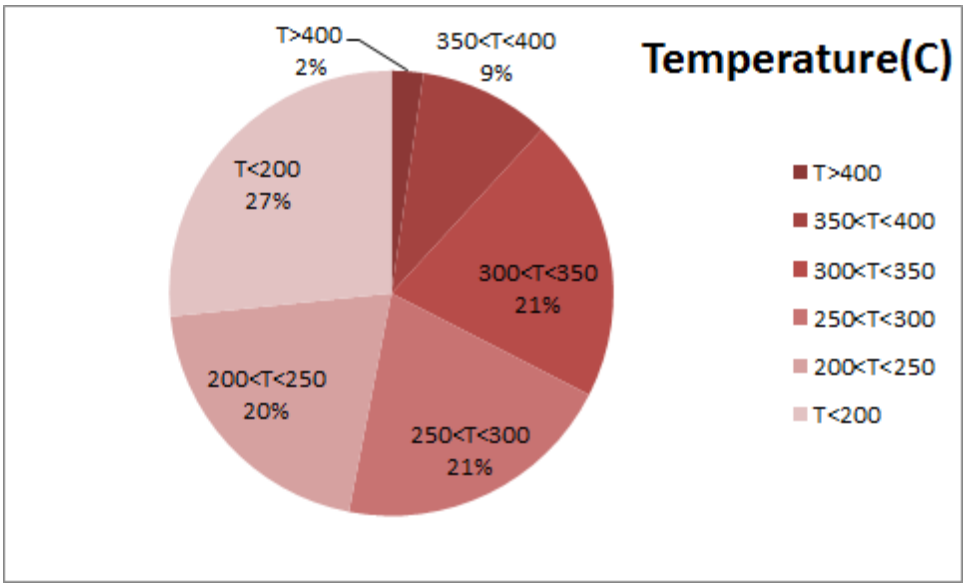


Figure 2-Temperature[1] distribution over the working hours

[1]- Flow temperature (DPF's upstream)

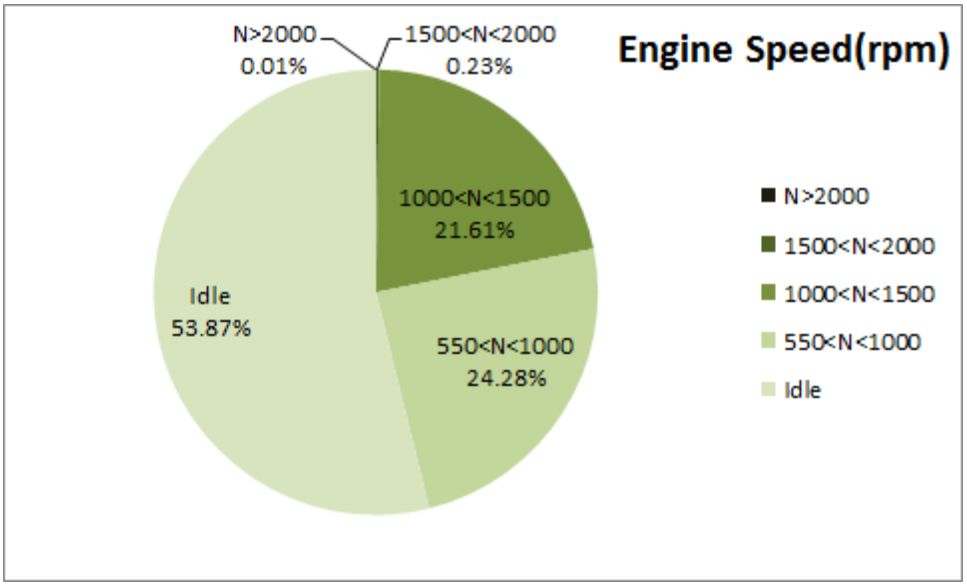


Figure 3- Engine speed distribution over the working hours

Notice: This vehicle cooler system was not used during this period. So upper limit for idle engine speed was considered to be 550 rpm.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
258.26	36.80	731

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
316.48	59.82	950

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	351-0	2128-256

[2]- Flow temperature (DPF's upstream)

Detailed Pressure Analysis

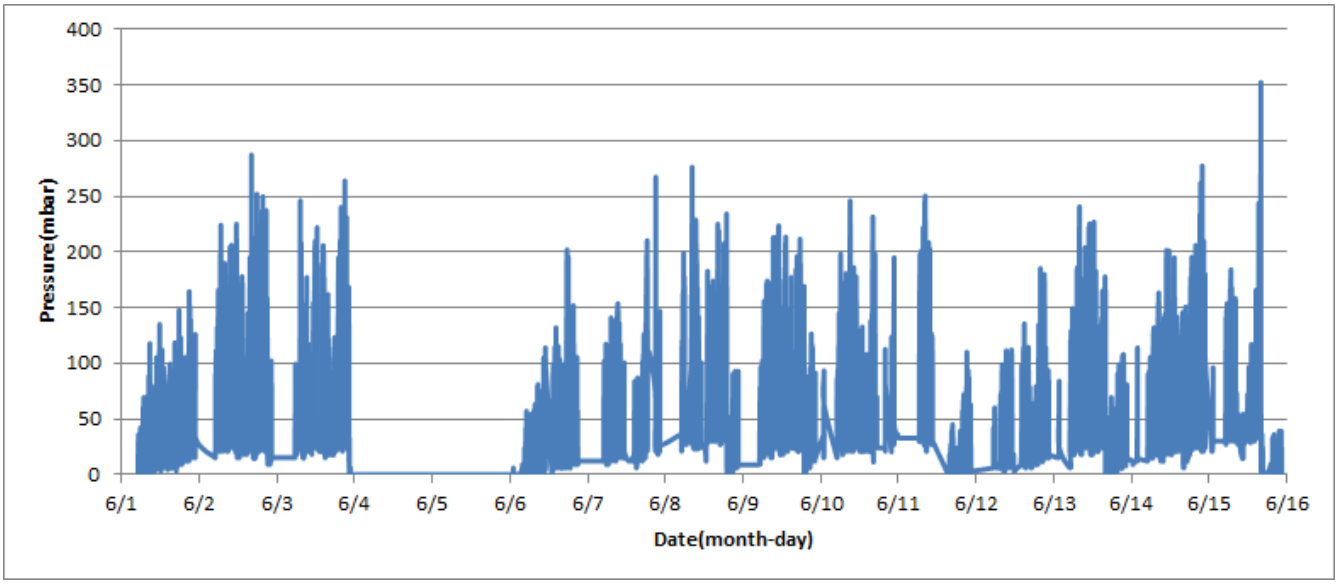


Figure 4- Pressure distribution over the fifteen days

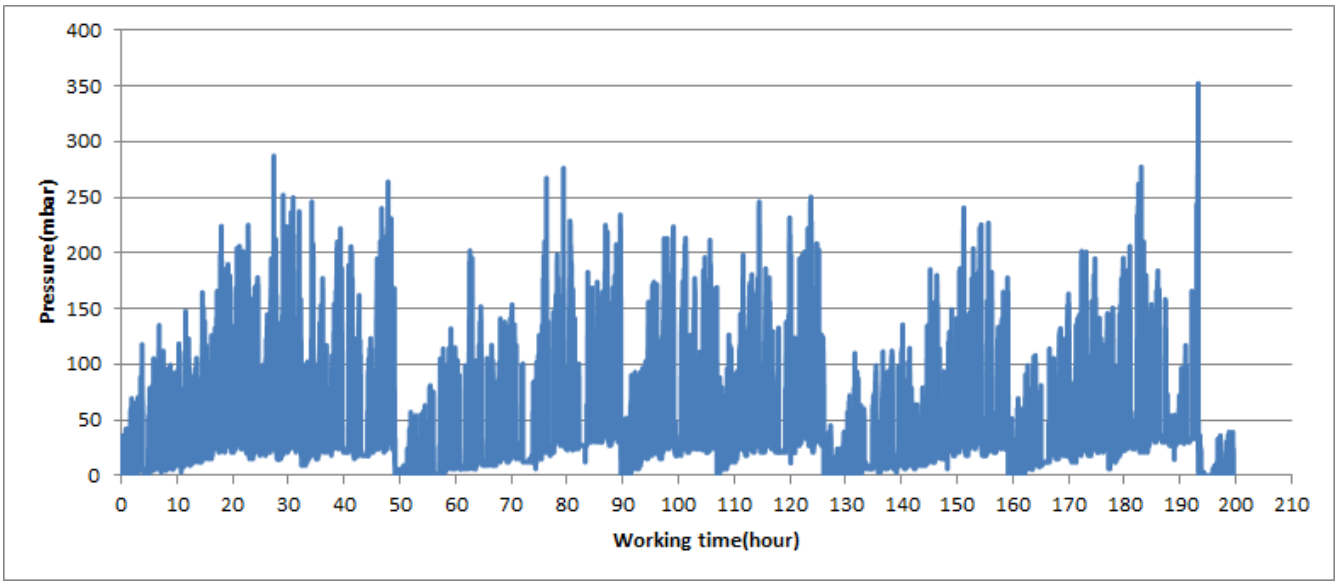


Figure 5- Pressure vs. working hours

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

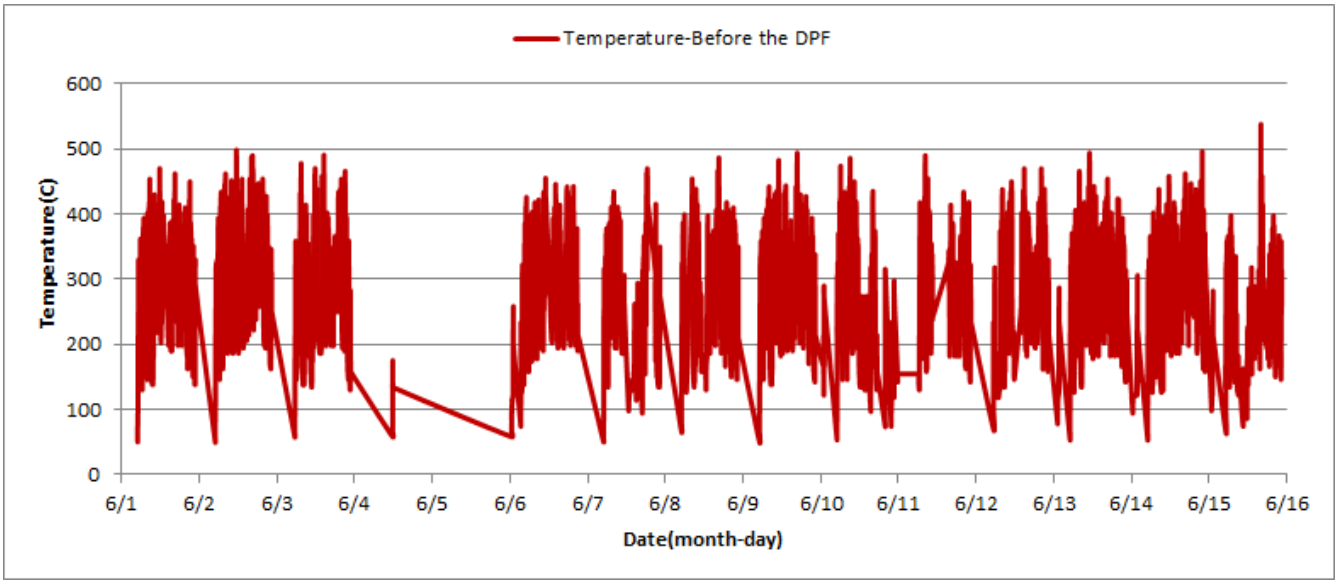


Figure 6- Temperature distribution over the fifteen days

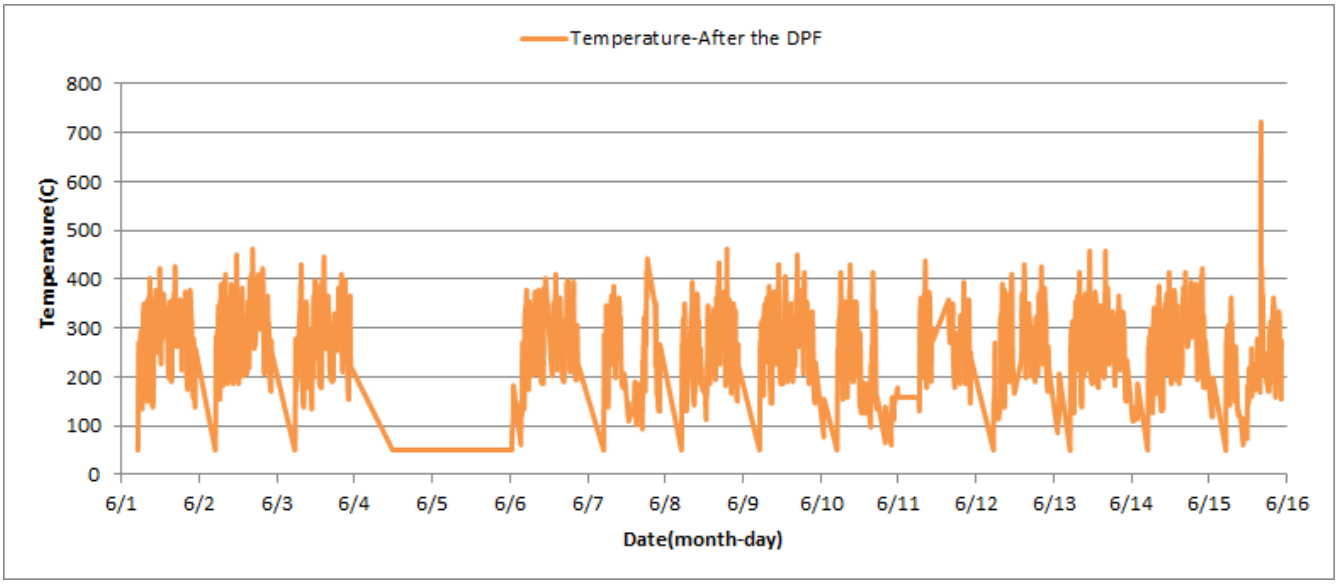


Figure 7- Temperature distribution over the fifteen days

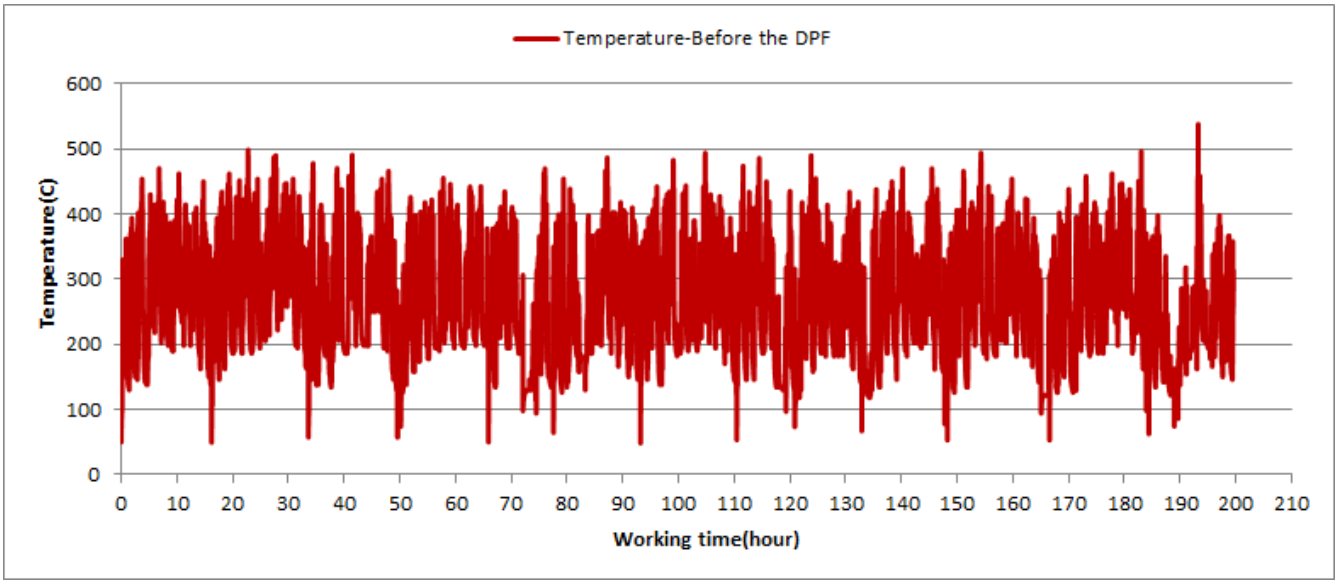


Figure 8- Temperature vs. working hours

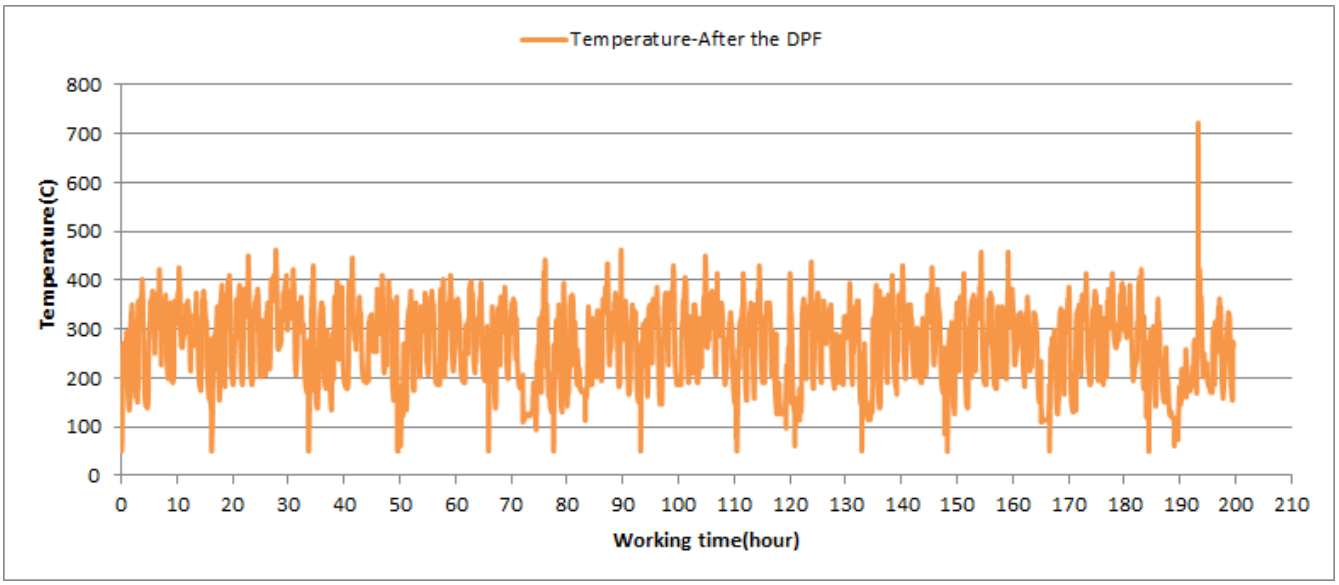


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

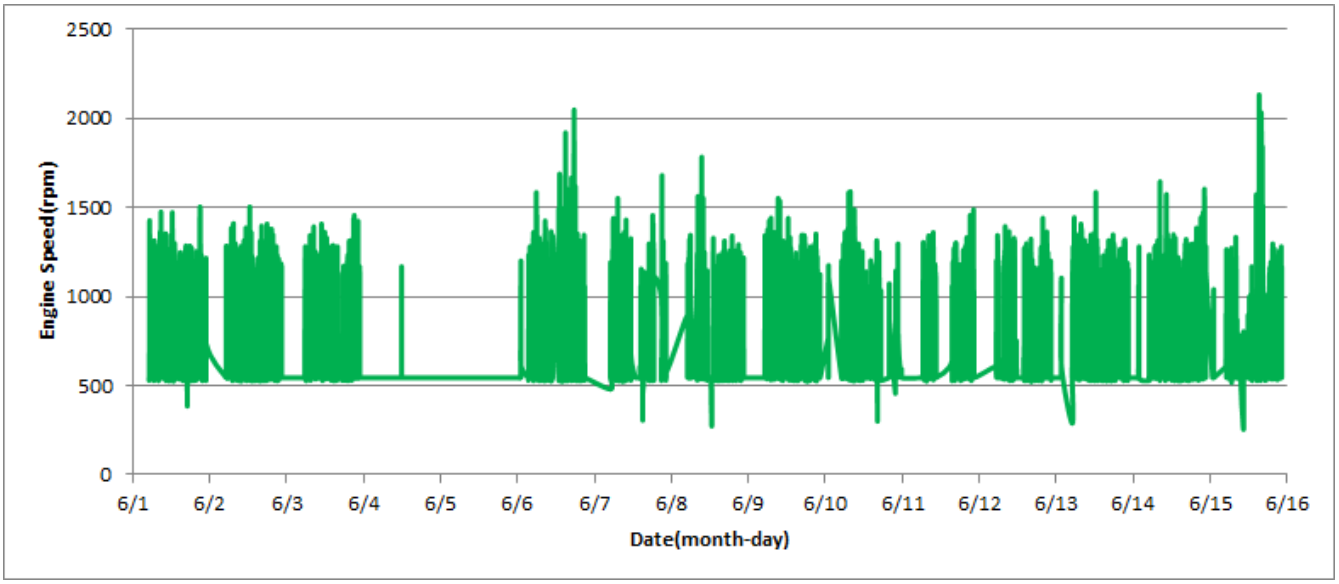


Figure 10- Engine speed distribution over the fifteen days

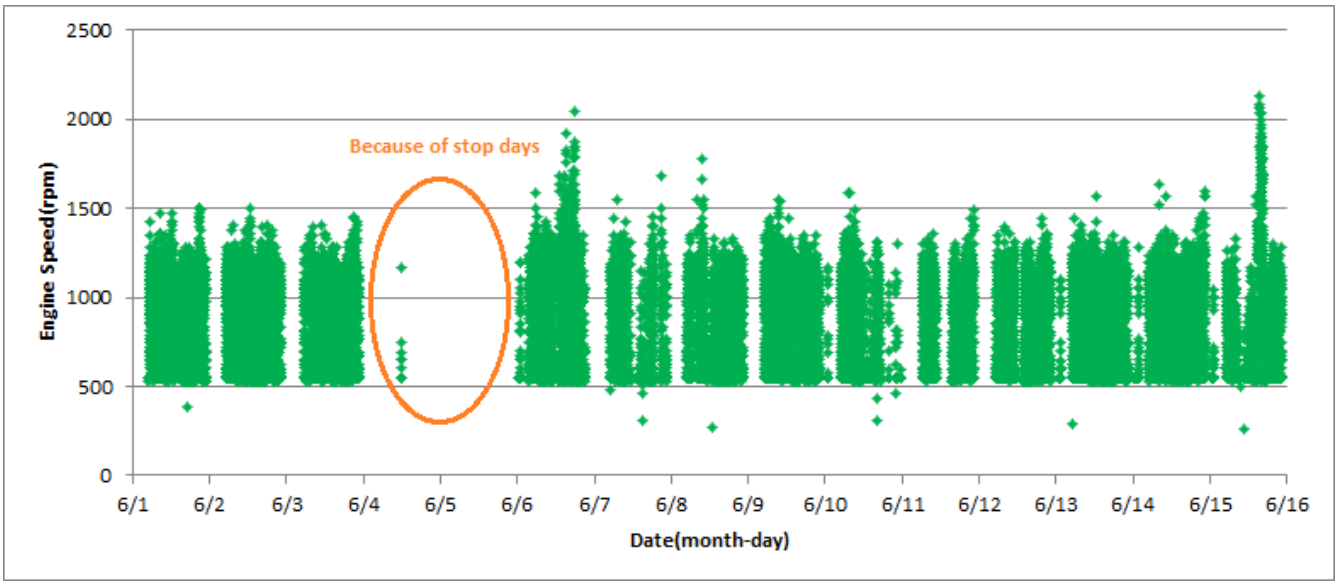


Figure 11- Engine speed diagram for calculating CPK's working days

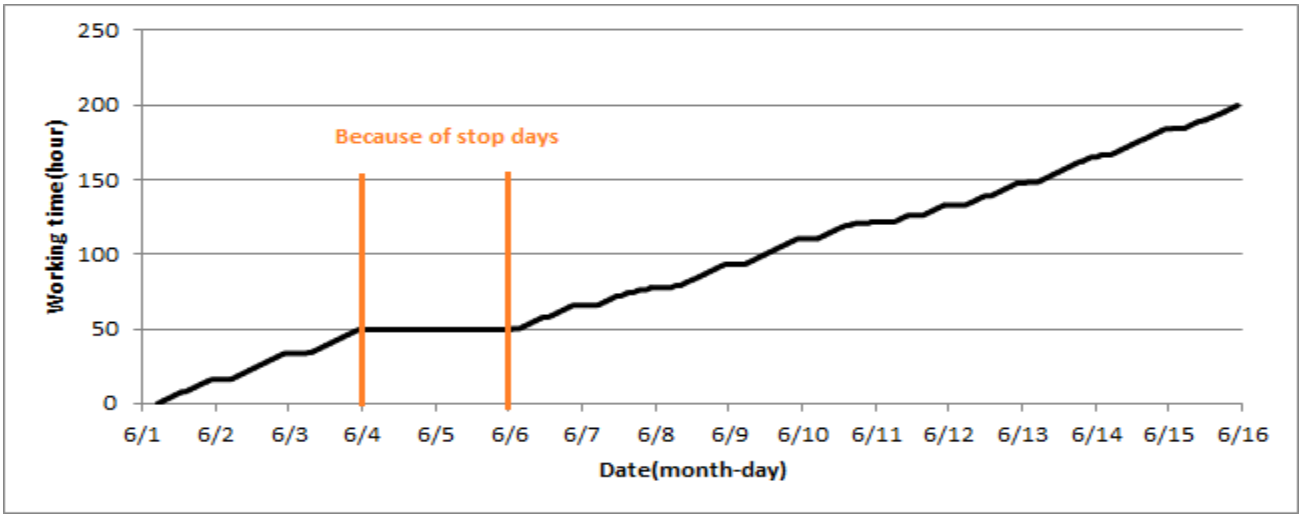


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without CPK's (data logger) data. As depicted in Figure 12, data logger didn't sample on Jun 4th and 5th because of stop days.

Pressure-Engine Speed diagrams

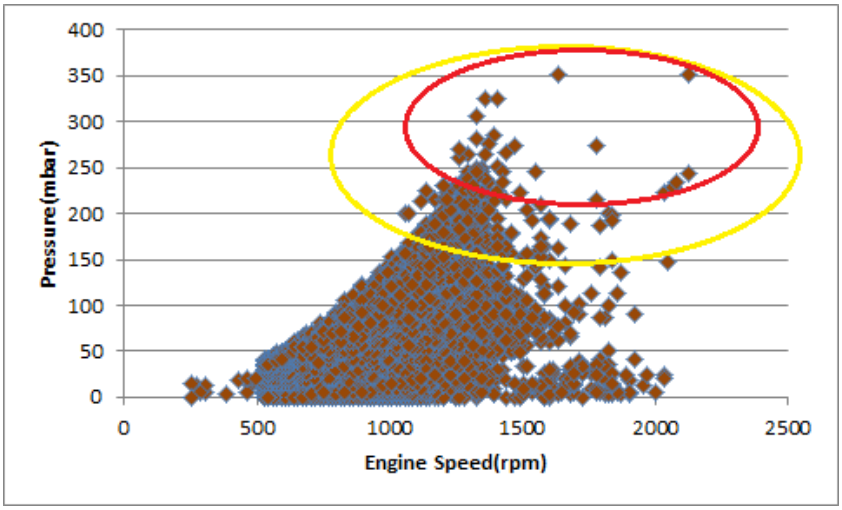


Figure 13- Pressure against engine speed

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

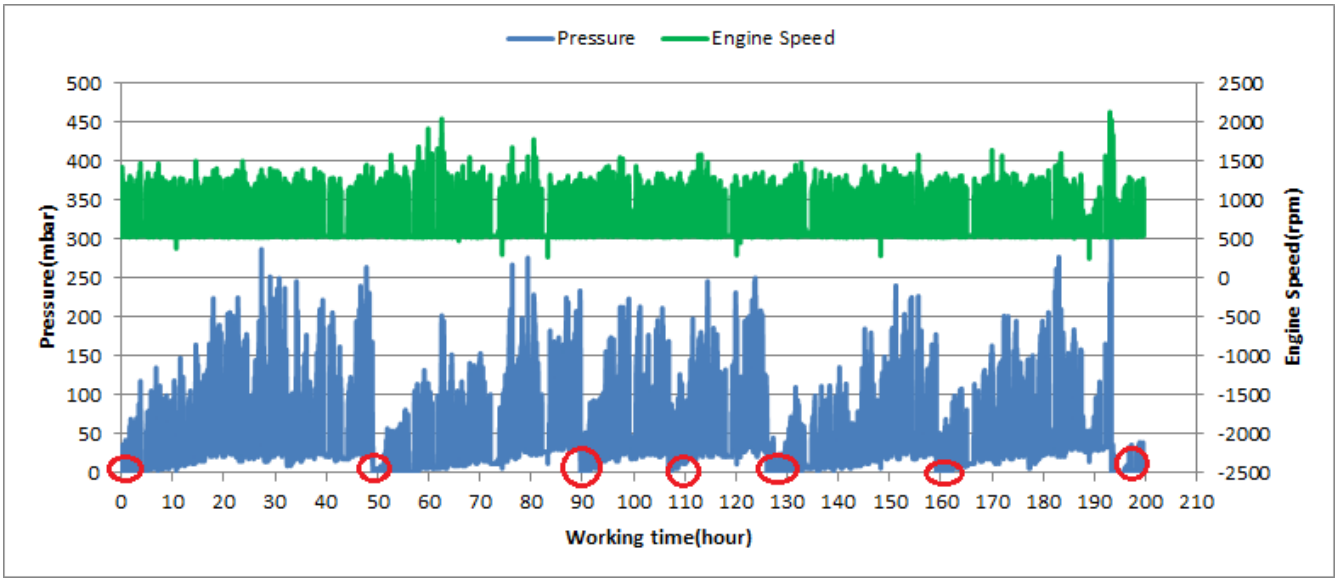


Figure 14- P, N distribution vs. working hours

Notice: The red circles show probable active regeneration times.

Temperature- Engine Speed Diagram

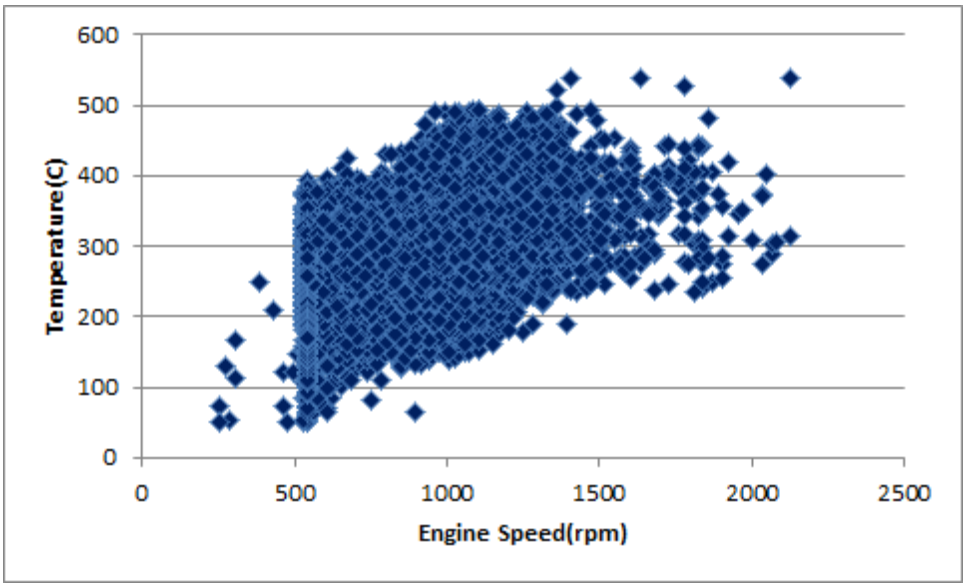


Figure 15- Temperature against engine speed

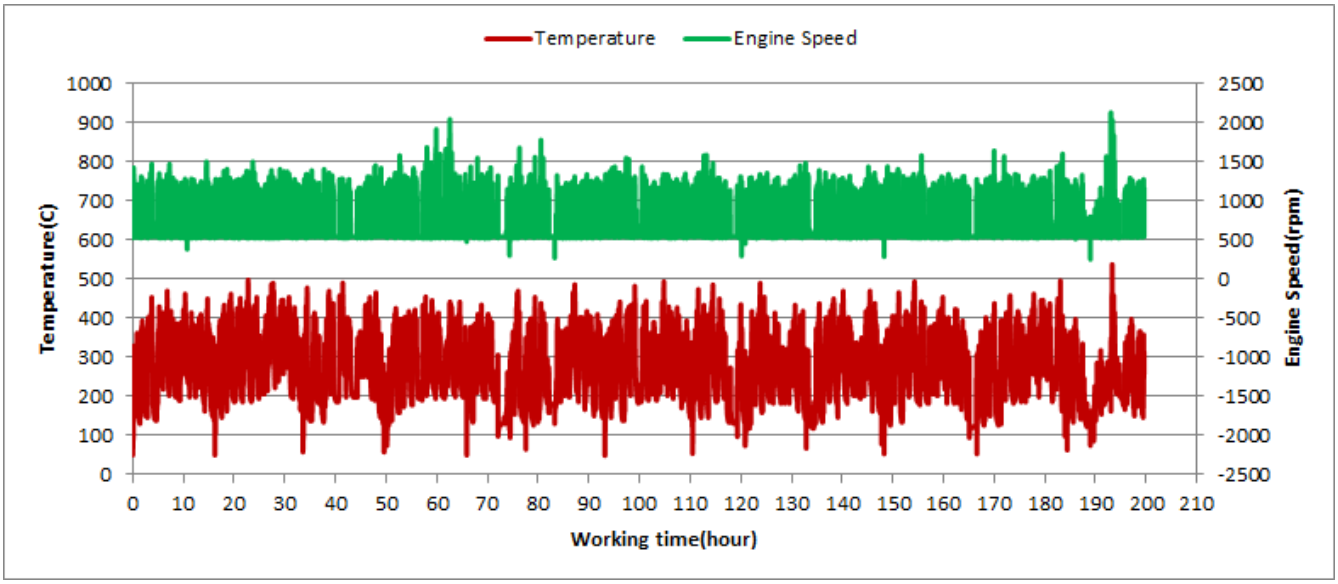


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1 only 0.18% of total working time, pressure is above 200 mbar and 1.18% above 150mbar. So it can be concluded that operation of this filter was reasonably acceptable during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed only 2 % of total working time, temperature is above 400°C.
- This vehicle operates in line 2. Because of smooth path of this line, engine operates in low rotational speed. It is worth-mentioning this low engine speed distribution causes low temperature distribution.

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

Overall Information

Table1- Overall Information

Vehicle plate number	33572 (28958)
CPK data logger number	LN: 001521, DN: 1995, Sim Number +989218469643
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF producer company	HJS_03 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Jun/2015 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	1.71$[m^{-1}]$
K value – DPF's downstream	0.08 $[m^{-1}]$

Table 2- Maintenance Table

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)	18712 km
Bus mileage over the period	2419 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	199 hours, 12 minutes
Average working hours per a day (including stop days)	13 hours, 16 minutes
Bus average speed	2.14 km/hr
Idle speed time to all working time ration	51%
Total bus fuel consumption over the period	1583 lit
Fuel consumption per hour	7.94 lit/hr
Average fuel consumption	0.65 lit/km
Total bus additive consumption over the period	0.657 lit
Average additive consumption	0.272 cc/km
Additive consumption to fuel ration	415 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

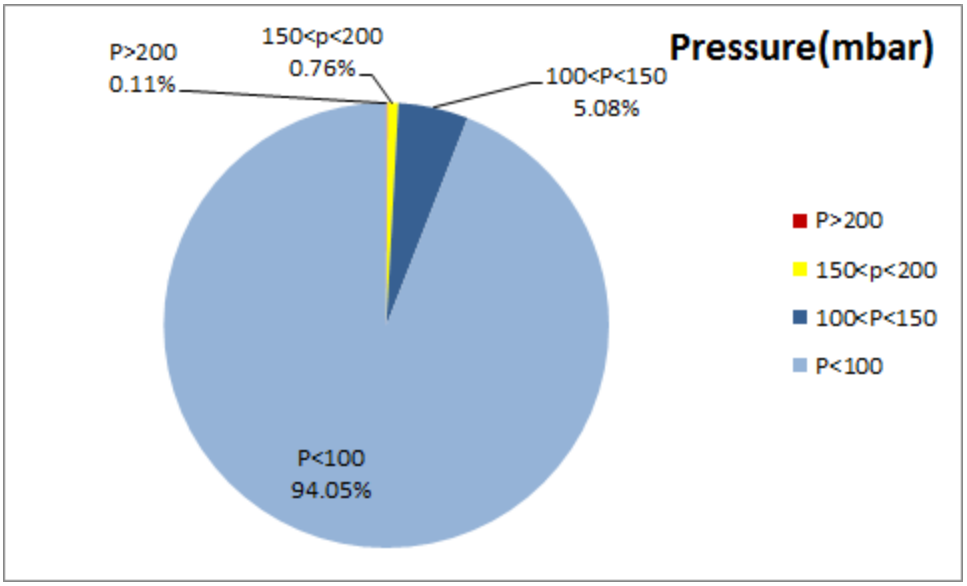


Figure 1- Pressure distribution over the working hours

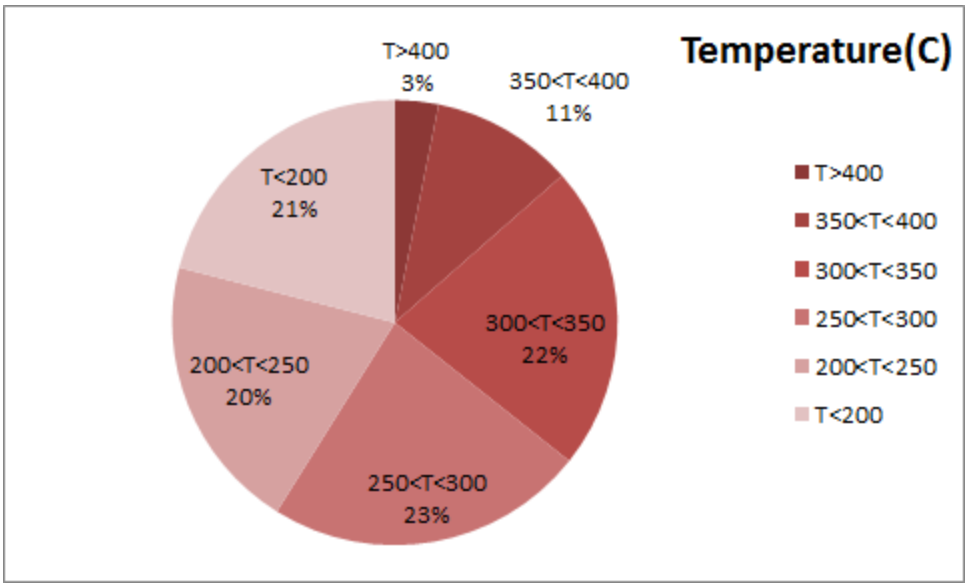


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

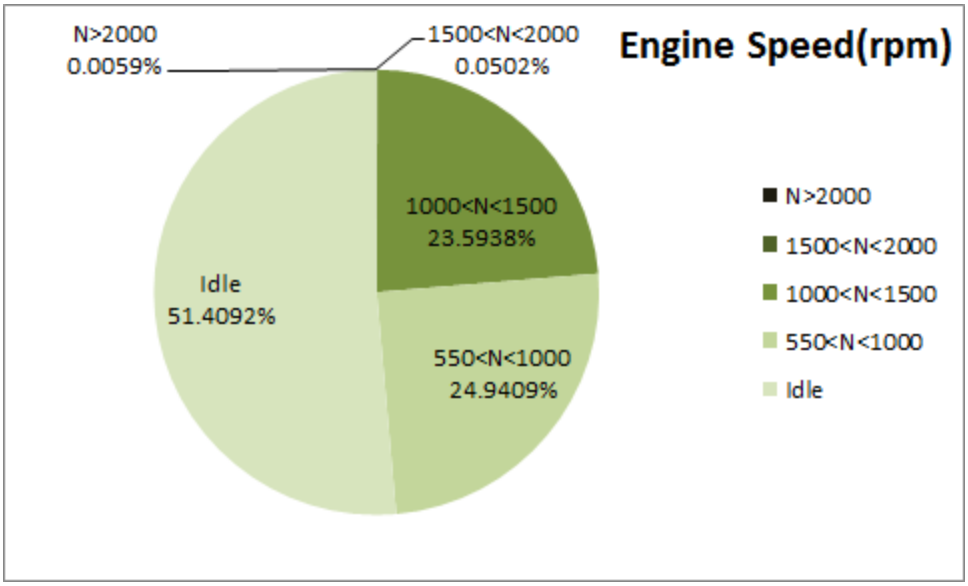


Figure 3- Engine speed distribution over the working hours

Notice: This vehicle cooler system was not used during this period. So upper limit for idle engine speed was considered to be 550 rpm.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
267.29	33.32	743

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
320.41	54.63	954

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
510-50	303-0	2128-256

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

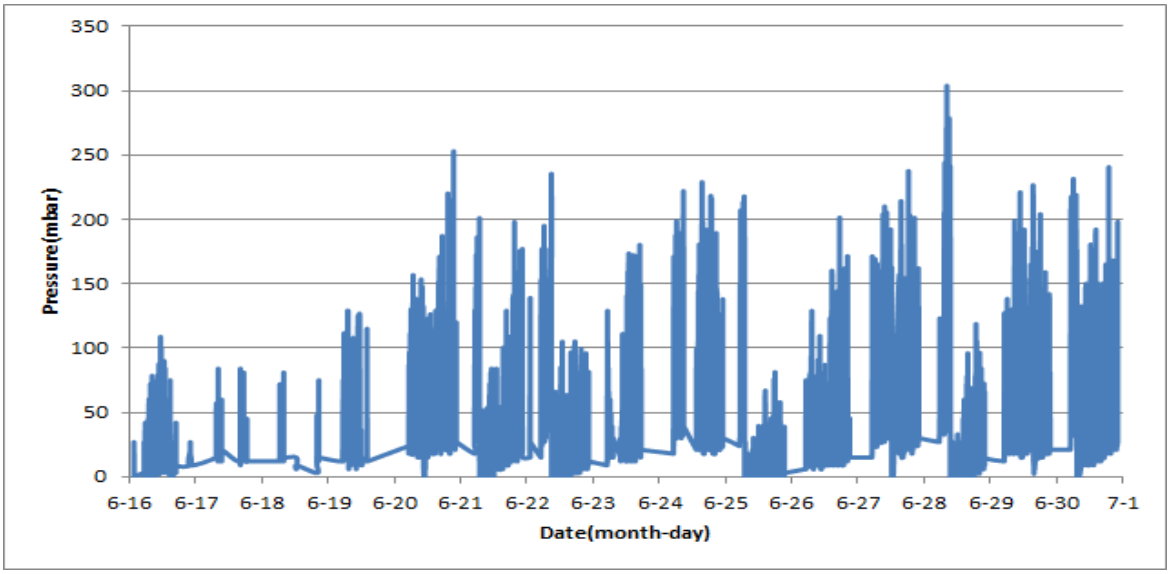


Figure 4- Pressure distribution over the fifteen days

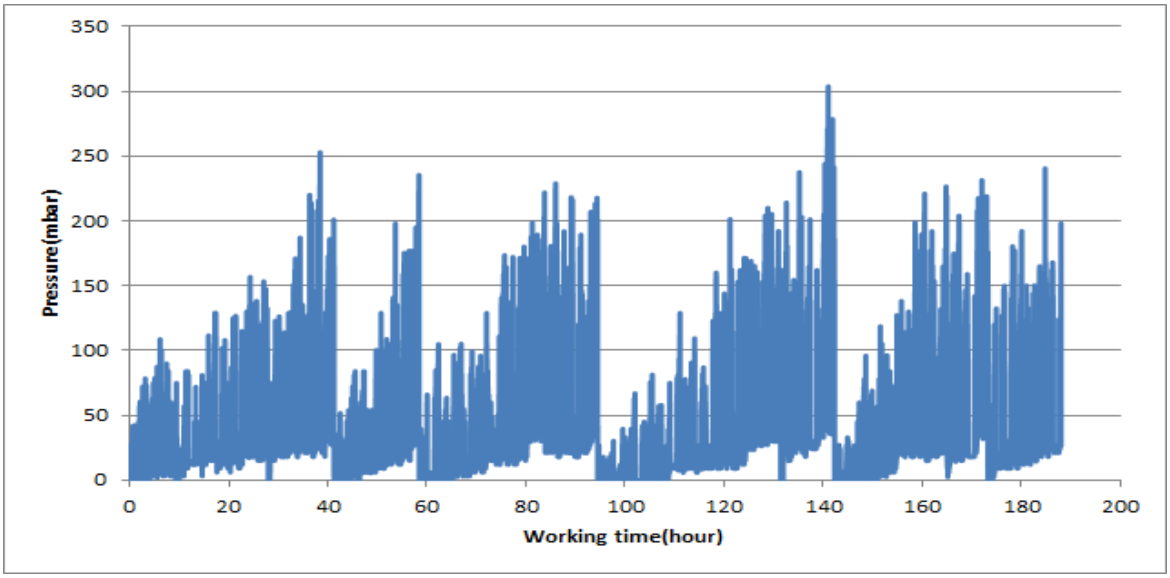


Figure 5- Pressure vs. working hours

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

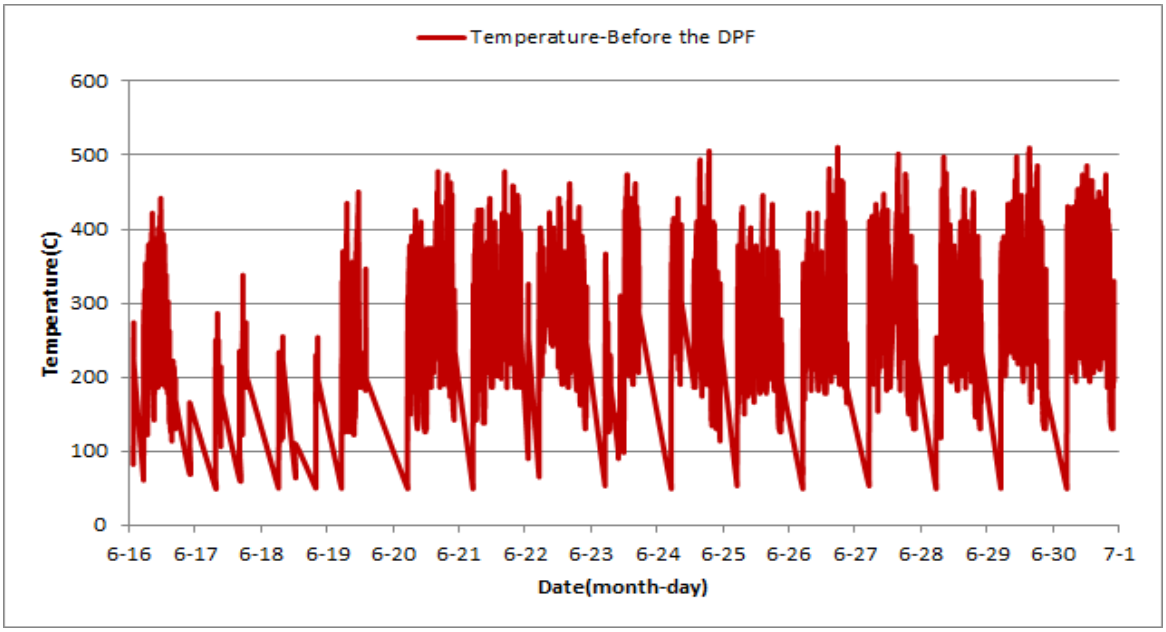


Figure 6- Temperature distribution over the fifteen days

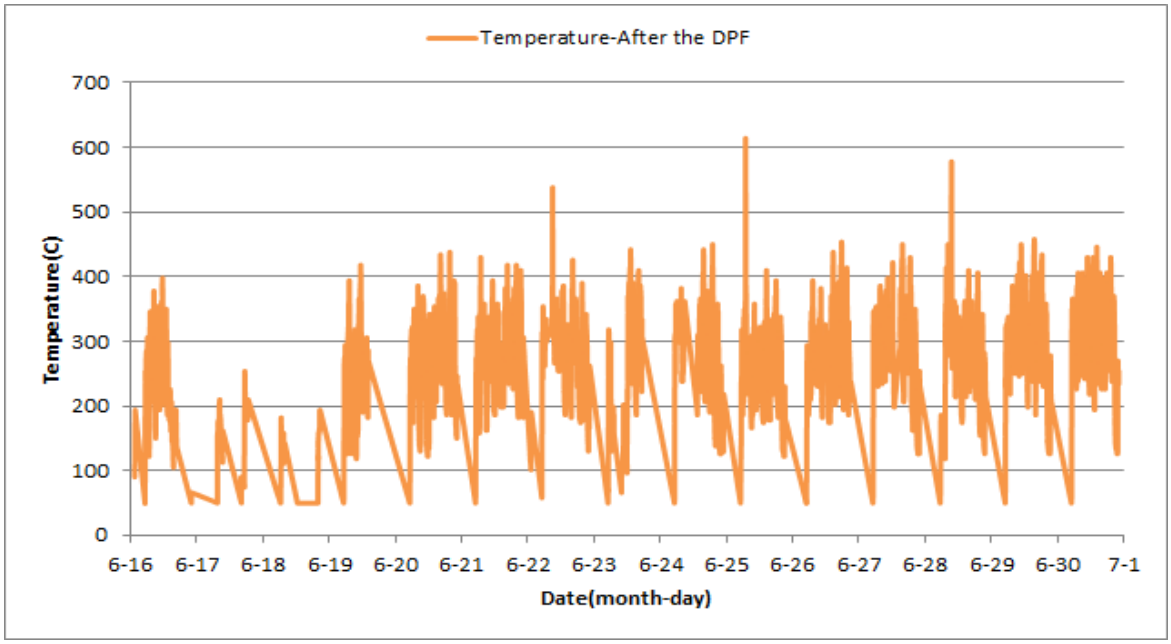


Figure 7- Temperature distribution over the fifteen days

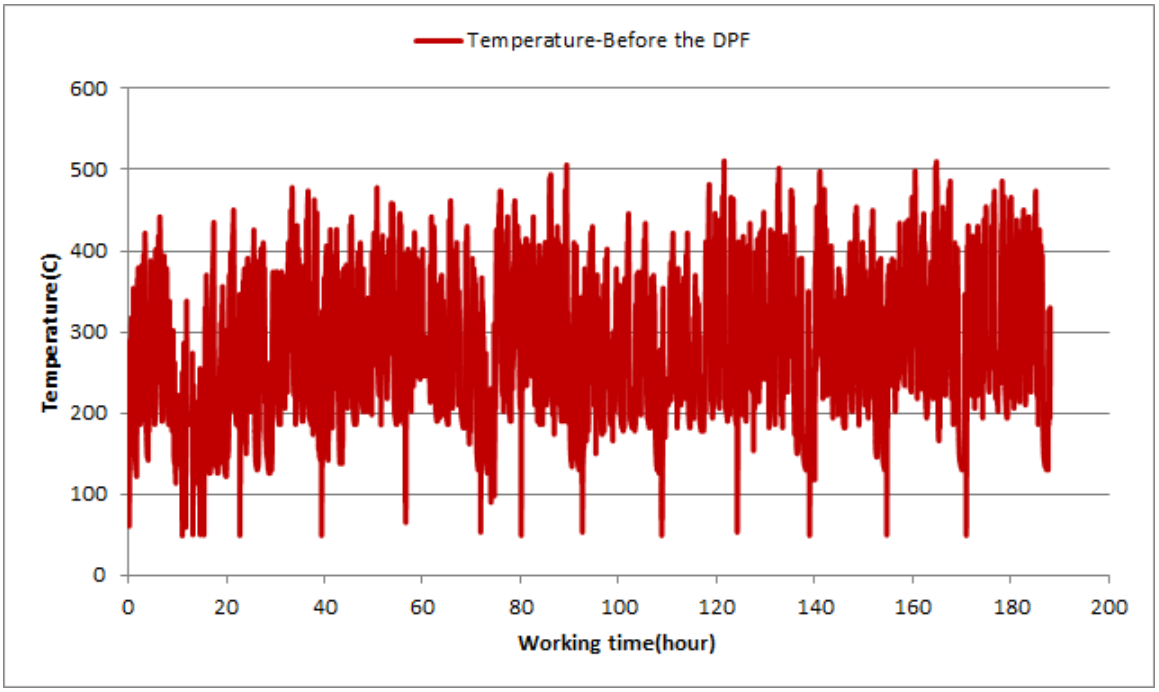


Figure 8- Temperature vs. working hours

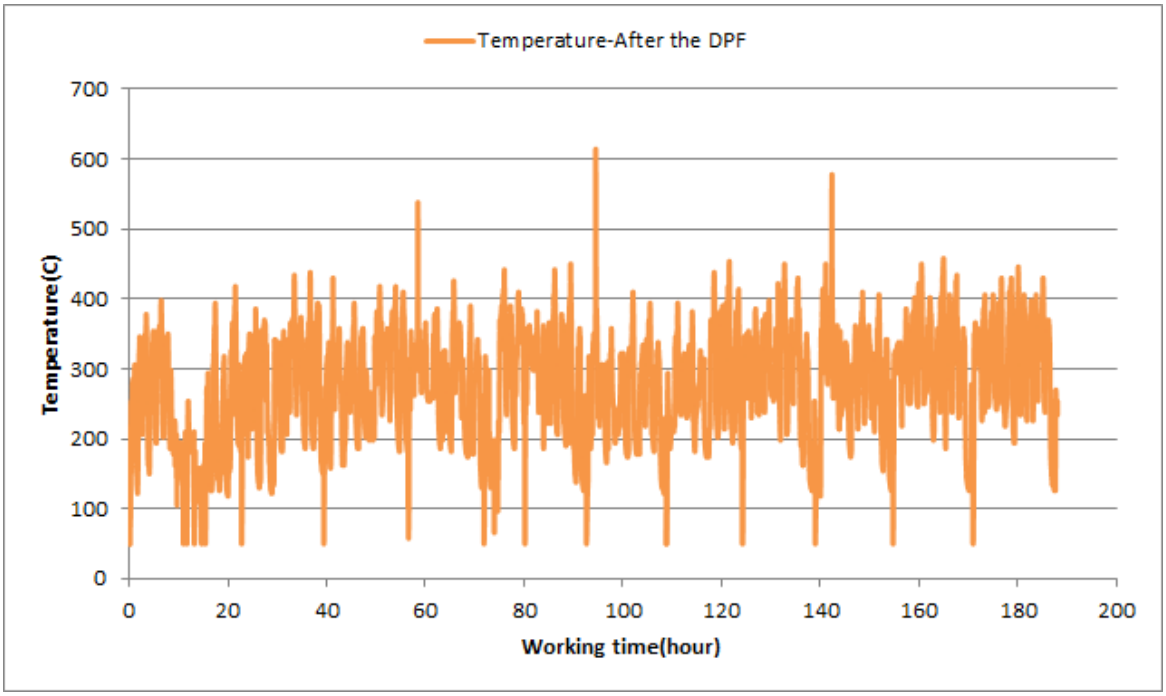


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

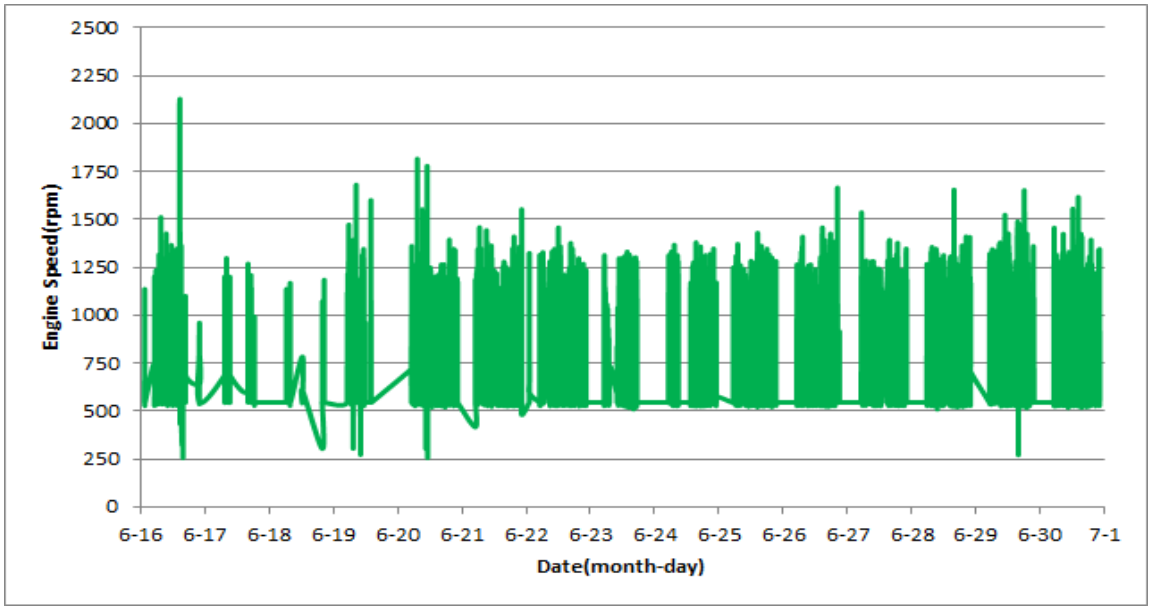


Figure 10- Engine speed distribution over the fifteen days

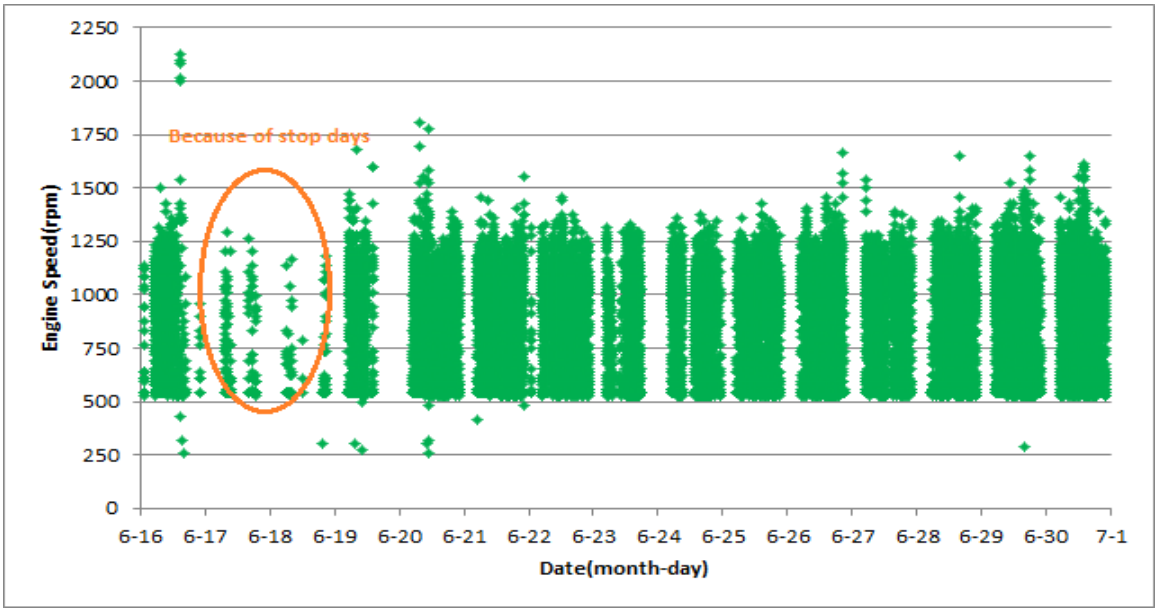


Figure 11- Engine speed diagram for calculating CPK's working days

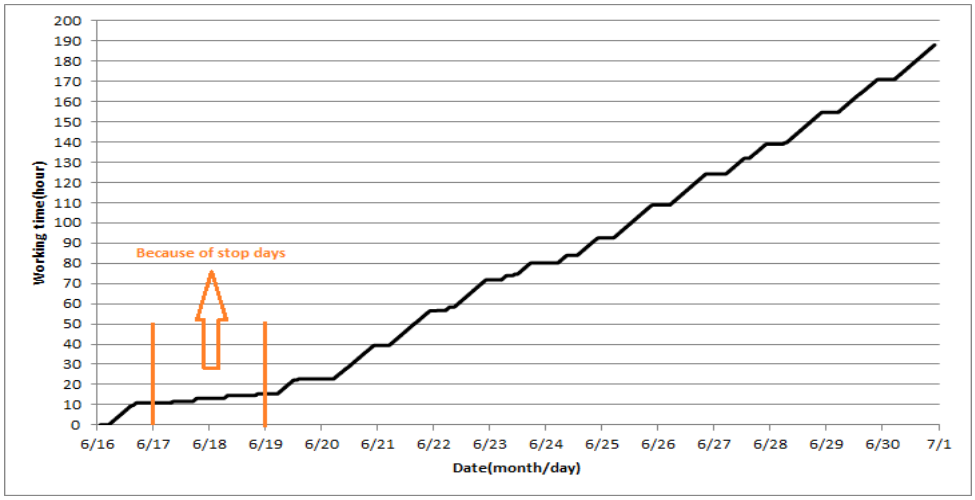


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without CPK's (data logger) data. As depicted in Figure 12, data logger didn't sample on Jun 18th and 19th because of stop days. (Bus was at mechanic garage on these dates)

Pressure-Engine Speed diagrams

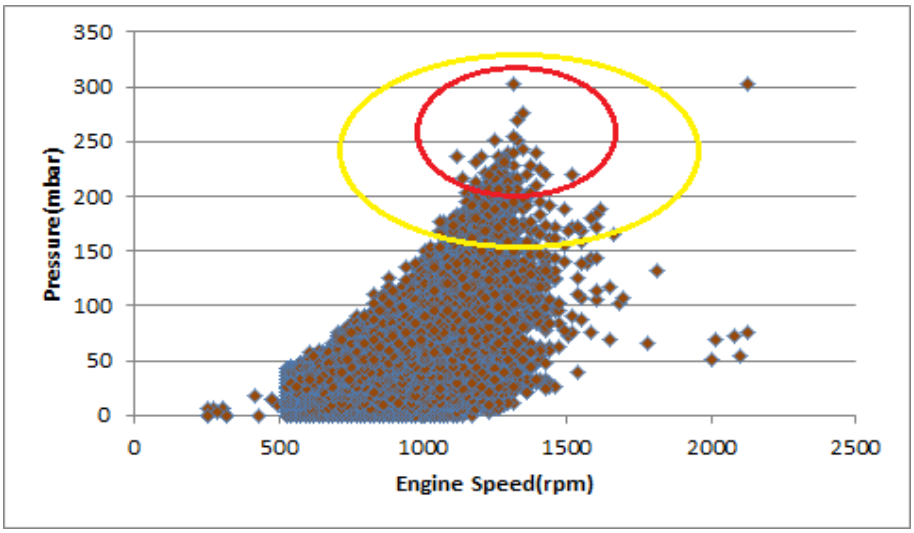


Figure 13- Pressure against engine speed

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

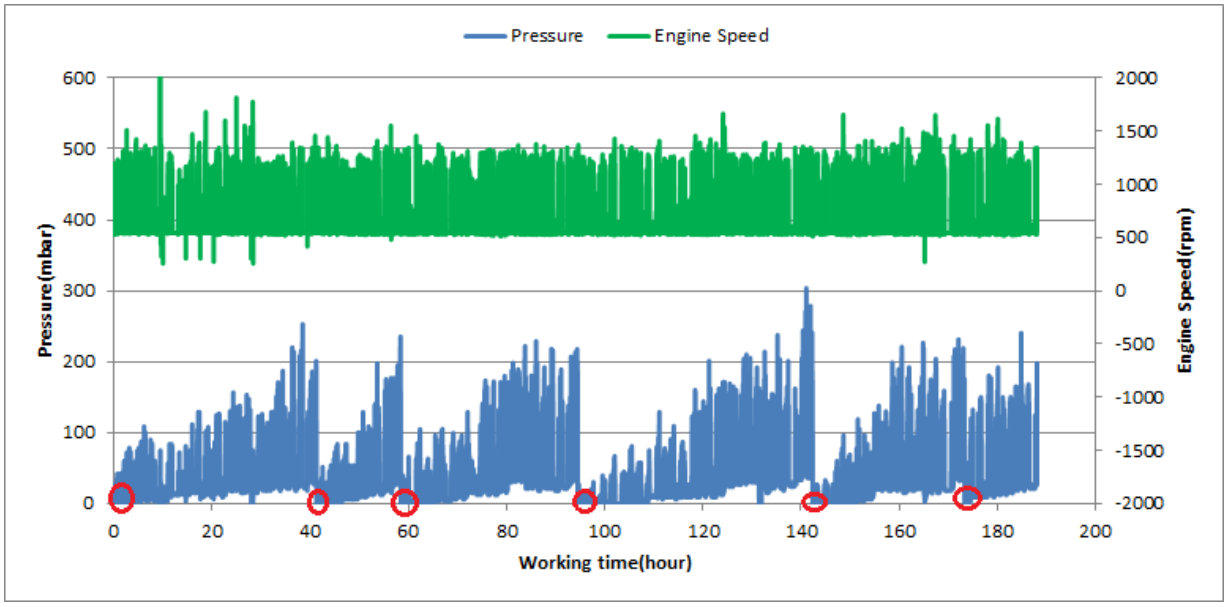


Figure 14- P, N distribution vs. working hours

Notice: The red circles show probable active regeneration times.

Temperature- Engine Speed Diagram

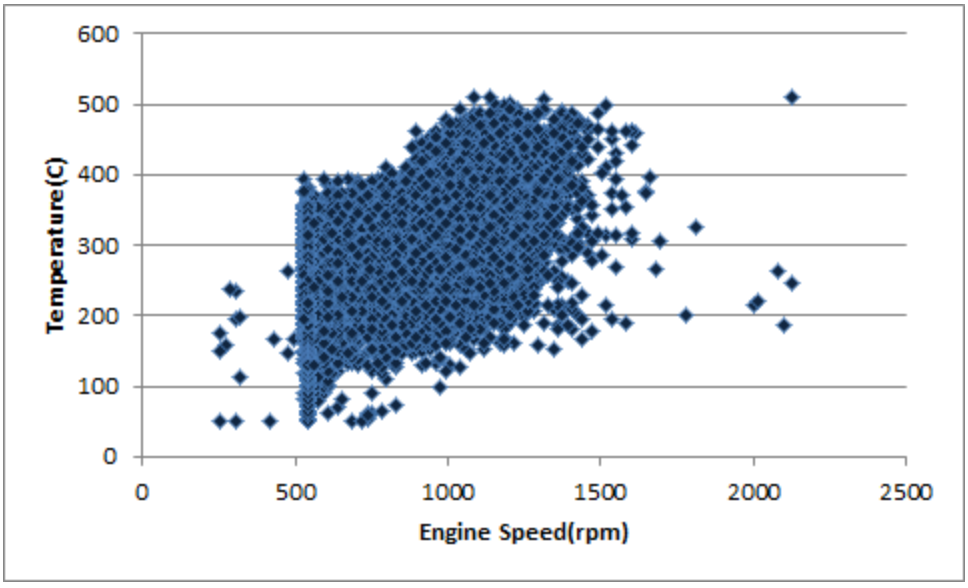


Figure 15- Temperature against engine speed

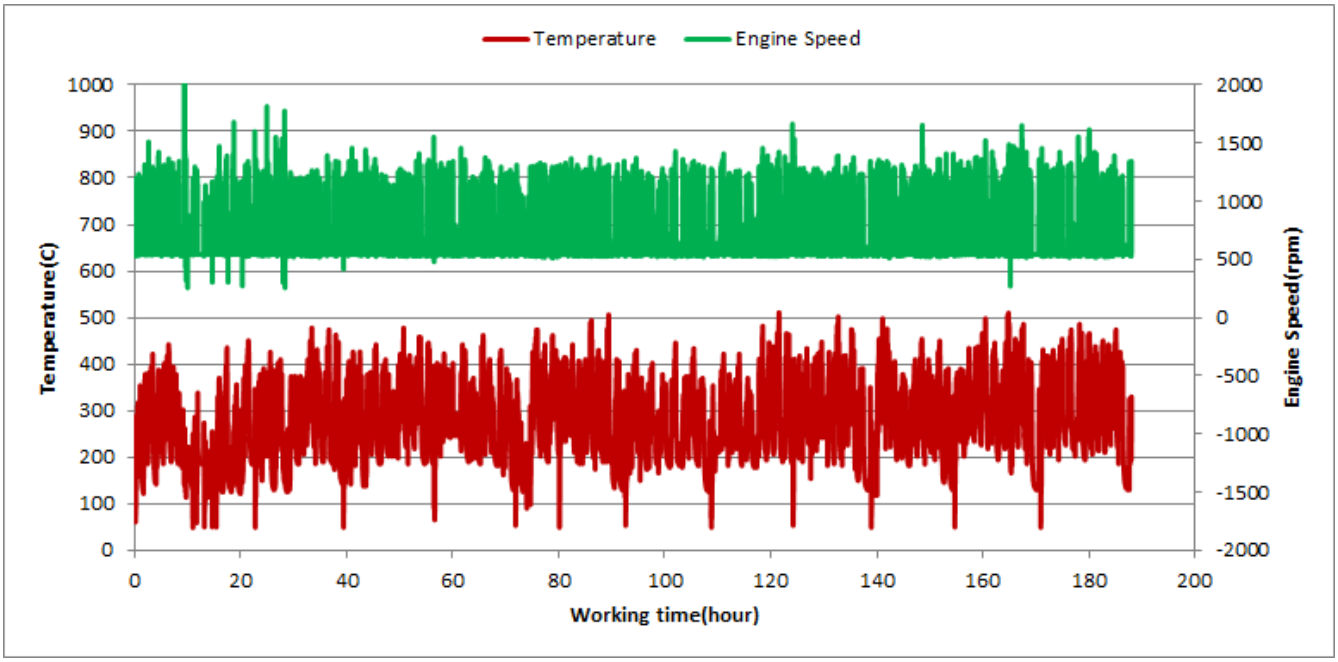


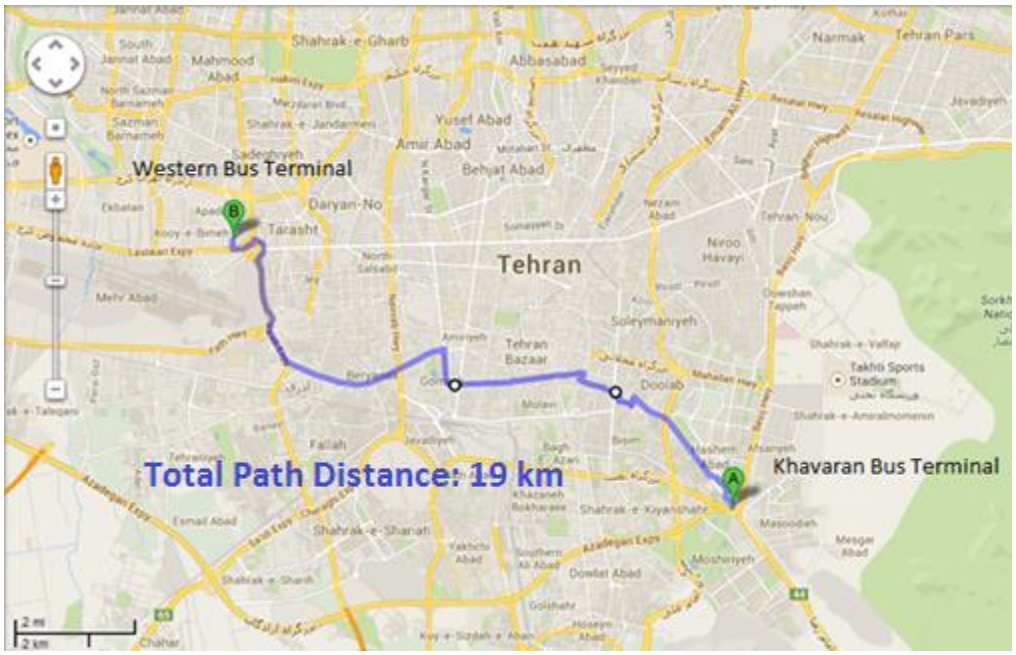
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.11% of total working time pressure is above 200 mbar and 0.88% above 150mbar. So it can be concluded that operation of this filter is reasonably acceptable in this condition.
- 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°C.
- This vehicle operates in line 2. Because of smooth path of this line, engine operates in low rotational speed. It is worth-mentioning this low engine speed distribution causes low temperature distribution.

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	3/Jun/2015 – 17/Jun/2015 (fifteen days)
K value – DPF's upstream	1.9 $[m^{-1}]$
K value – DPF's downstream	0.09 $[m^{-1}]$

Temperature, Pressure and Engine Speed Overview

Table 2- Mean values

Mean temperature[1](C)	Mean pressure(mbar)	Mean engine speed(rpm)
249.58	48.46	771.60

Table 3- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
634-50	660-0	2112-96

[1] - Flow temperature (DPF's upstream)

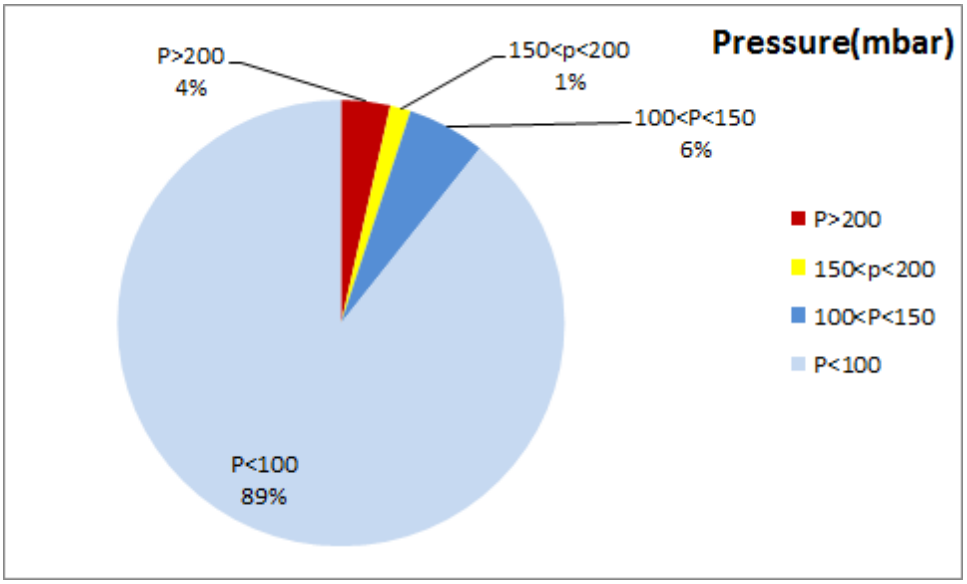


Figure 1- Pressure distribution over the working hours (after DPF installation)

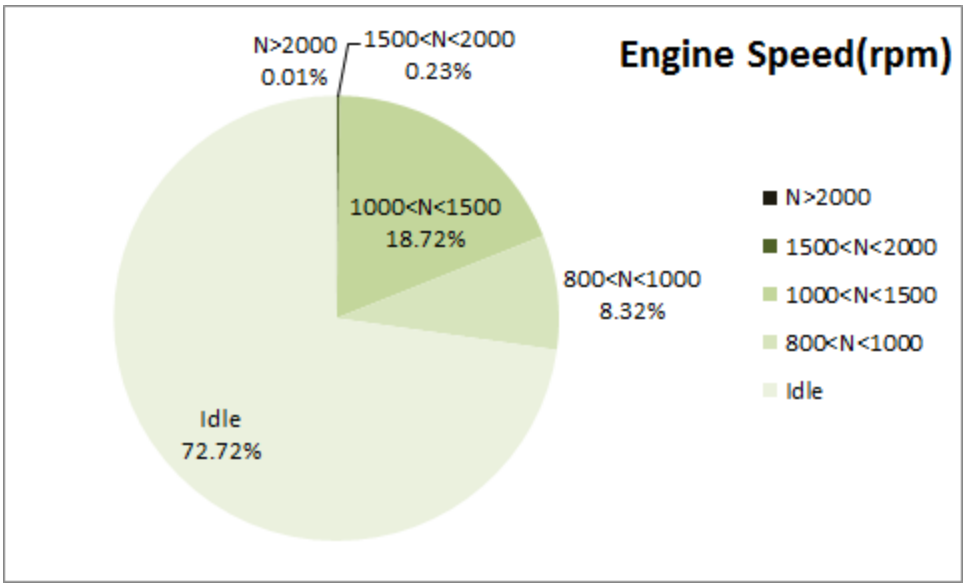


Figure 2- Engine speed distribution over the working hours

Notice: with using bus cooler system, idle rpm increase compare with working times without using ventilation system. So during hot months of year 800 rpm is considered as upper limit for idle engine speed.

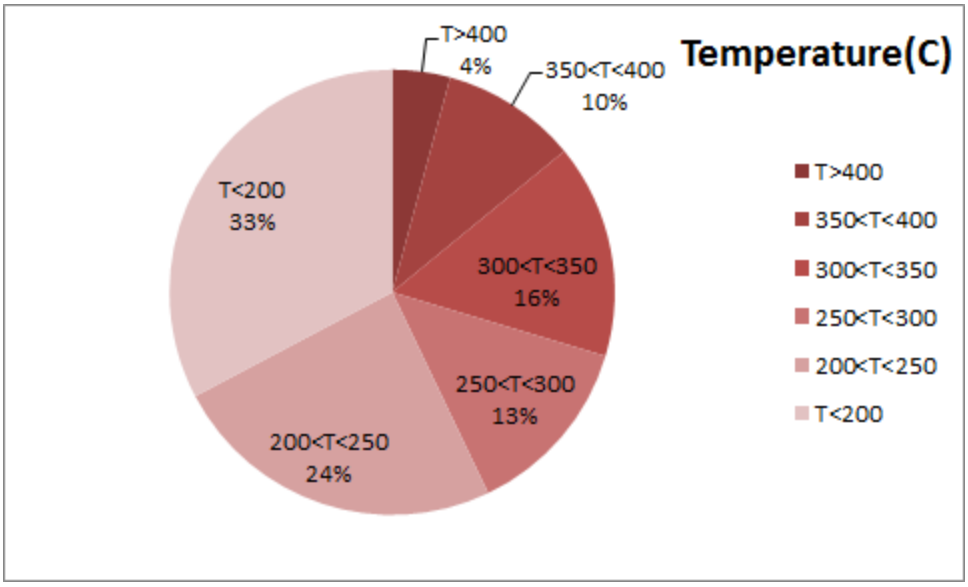


Figure 3-Temperature[2] distribution over the working hours (after DPF installation)

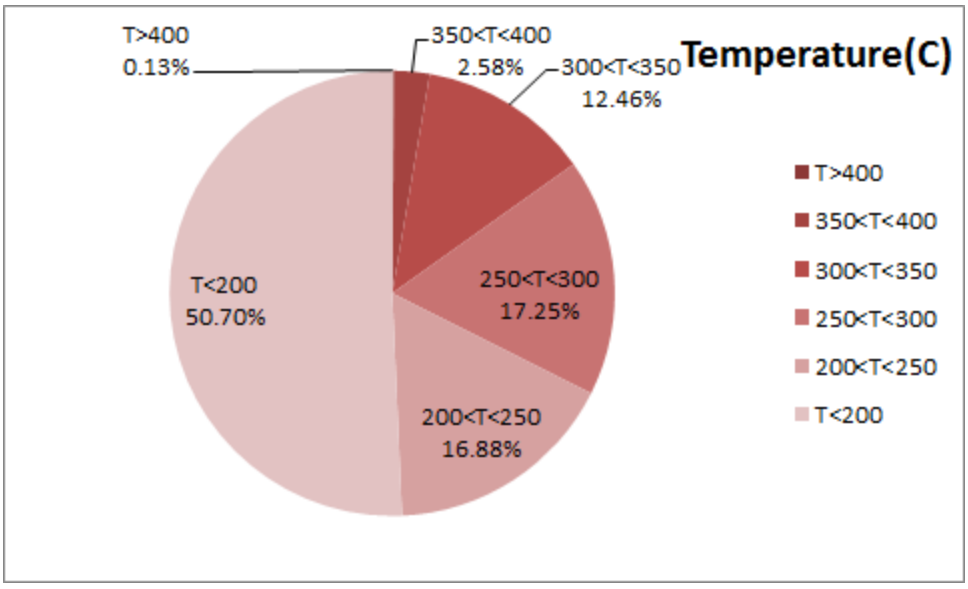


Figure 4- Temperature distribution over the working hours (before DPF installation)

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

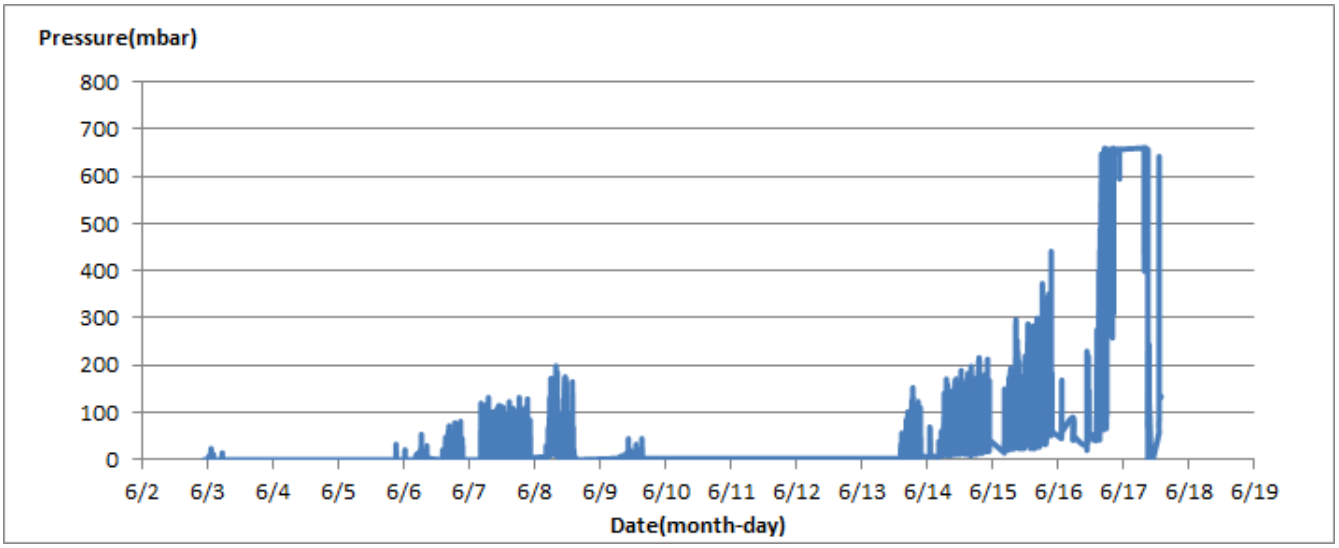


Figure 5- Pressure distribution over the fifteen days

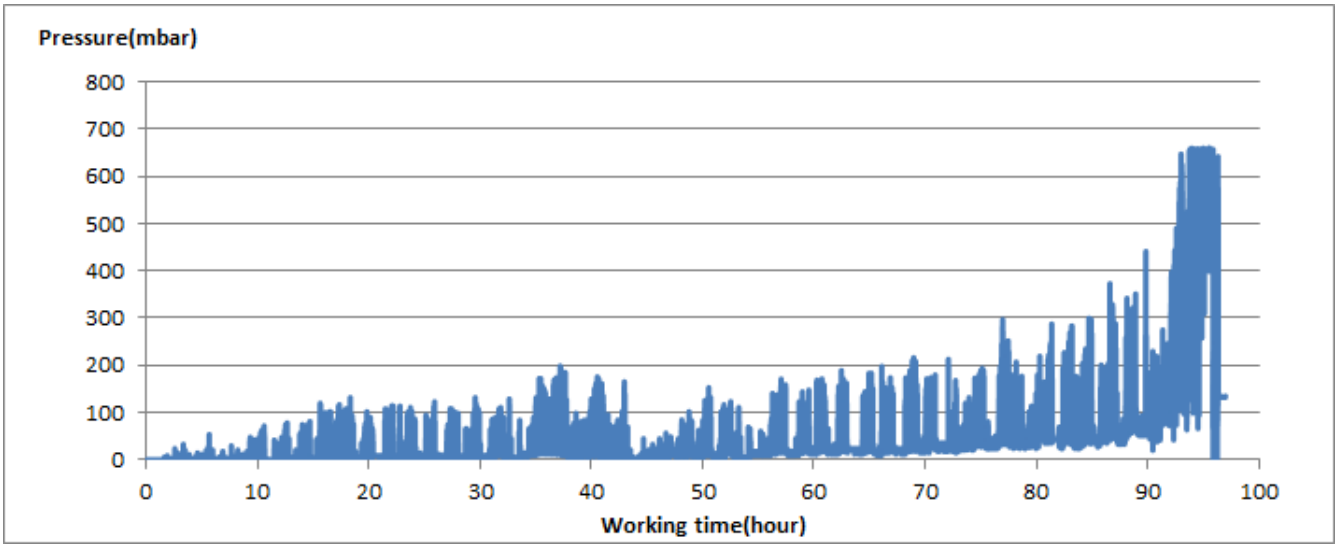


Figure 6- Pressure vs. working hours

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

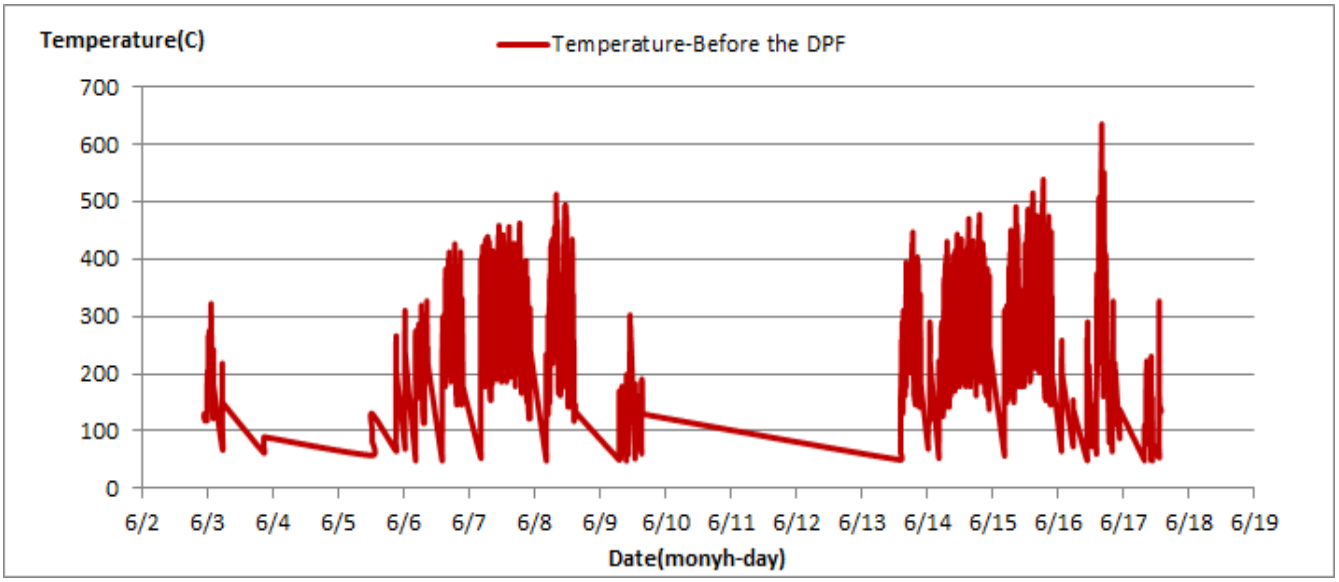


Figure 7- Temperature distribution over the fifteen days

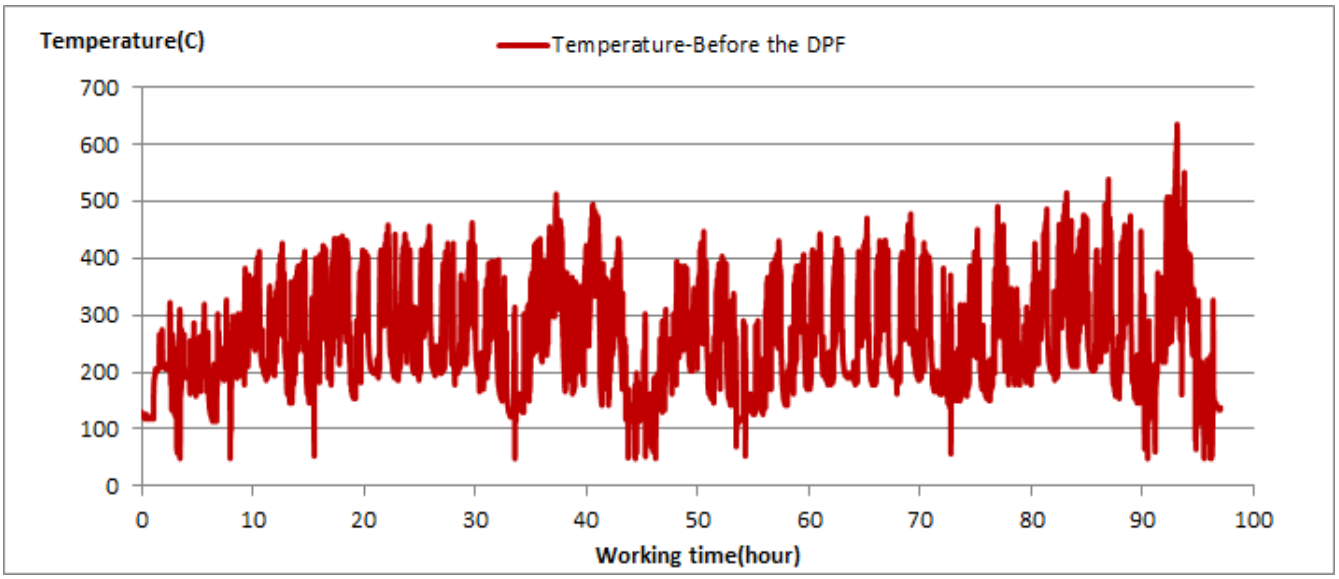


Figure 8- Temperature vs. working hours

Pressure-Engine Speed diagrams

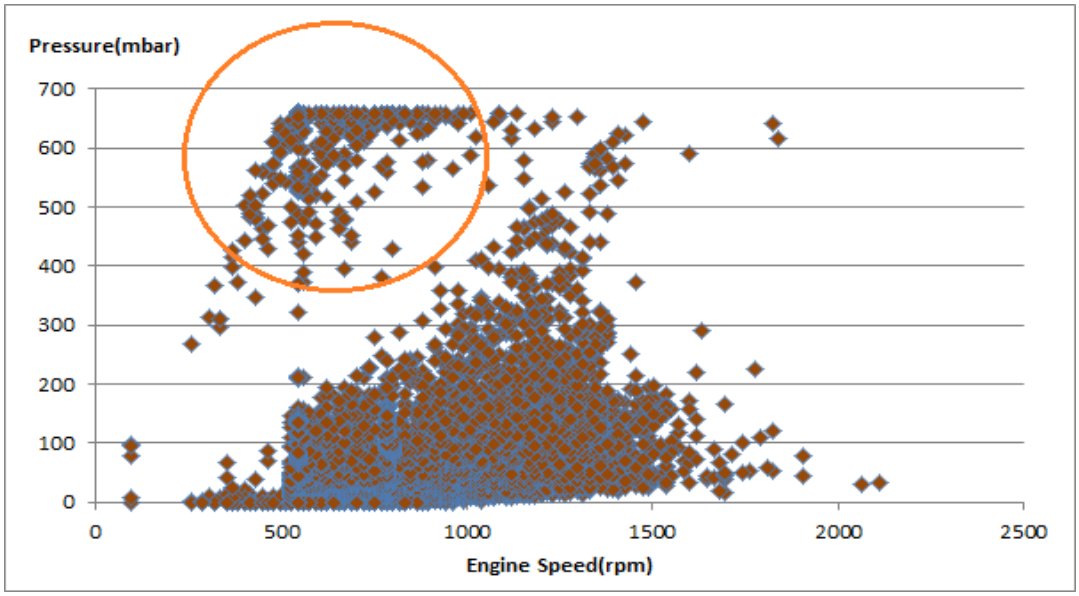


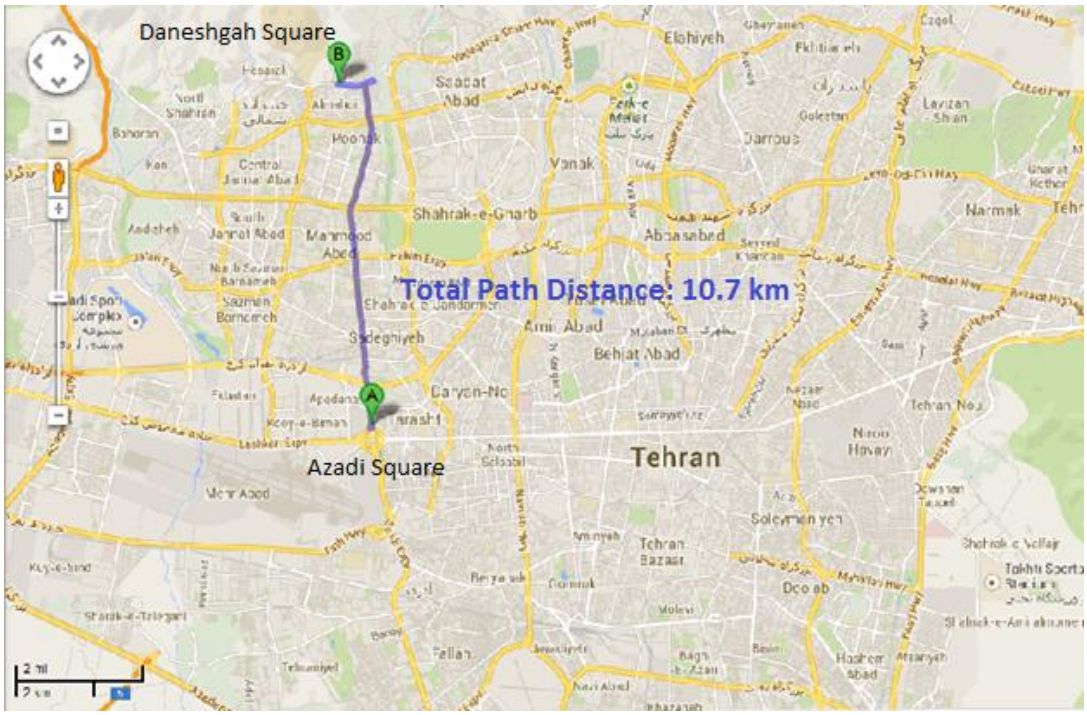
Figure 9- Pressure against engine speed

Filter Operation Analysis

- As depicted in Figure 1, 4% of total working time pressure is above 200 mbar and pressure above 600 mbar can be seen during this period.
- Figure 3 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 4 % of total working time, temperature is above 400°C. Considering Figure 3 it can be obtained that, high temperature distribution in figure 2 was the result of high backpressure. So this deceptive temperature distribution can't guarantee passive filter operation.
- The signed area in Figure 9 is a good reason to claim that this DPF need cleaning.
- Considering low additive dosing value for this period, cleaning and testing this system with more additive dosing can be valuable test.

Note:	Other parameters like additive consumption system and engine operation were checked.
Filter operation status	Excellent ☐ Good ☐ Maintenance required ■ Failed☐

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



Overall Information

Table 1- 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	HJS04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	1/Jun/2015 – 15/Jun/2015 (fifteen days)
K value – DPF's upstream	2.2 $[\mathrm{m}^{-1}]^{*}$
K value – DPF's downstream	0.03 $[m^{-1}]$

Notice: The K value for filter's upstream was high, because K value had been measured a day before bus oil service was done.

Table 2- Maintenance Table

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)	17004 km
Bus mileage over the period	2510 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	252 hours, 52 minutes
Average working hours per day (including stop days)	16 hours, 51minutes
Bus average speed	9.92 km/hr
Idle speed time to all working time ration	58%*
Total bus fuel consumption over the period	1742 lit
Fuel consumption per hour	6.9 lit/hr
Average fuel consumption	0.69 lit/km
Total bus additive consumption over the period	0.74lit
Average additive consumption	0.295 cc/km
Additive consumption to fuel ration	425 cc per 1000 lit (batch dosing with tank level)

Notice: Due to rpm sensor's problem temperature data were used for calculating idle speed time instead of engine speed data.

Temperature, Pressure and Engine Speed Overview

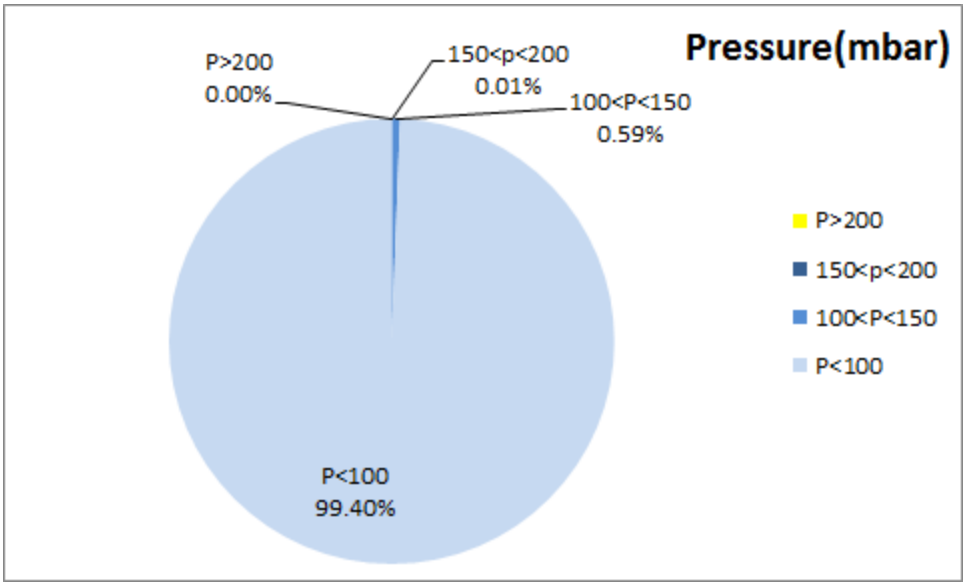


Figure 1- Pressure distribution over the working hours

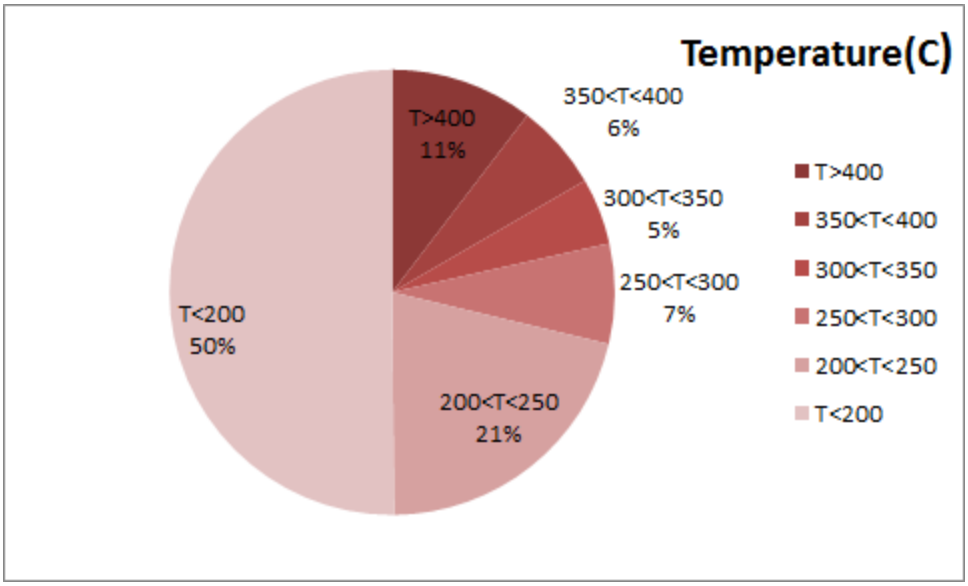


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

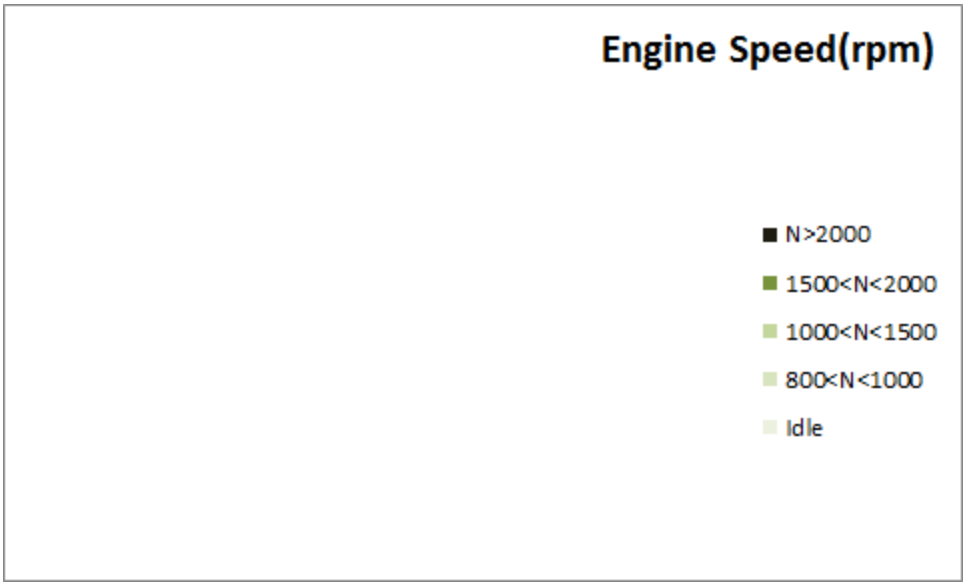


Figure 3- Engine speed distribution over the working hours

Notice: because of engine speed sensor's problem some data missed. So engine speed diagrams are blank.

Table 3- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
232.14	10.94	-

Table 4- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
322.60	21.35	-

Table 5- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
526-74	177-0	-

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

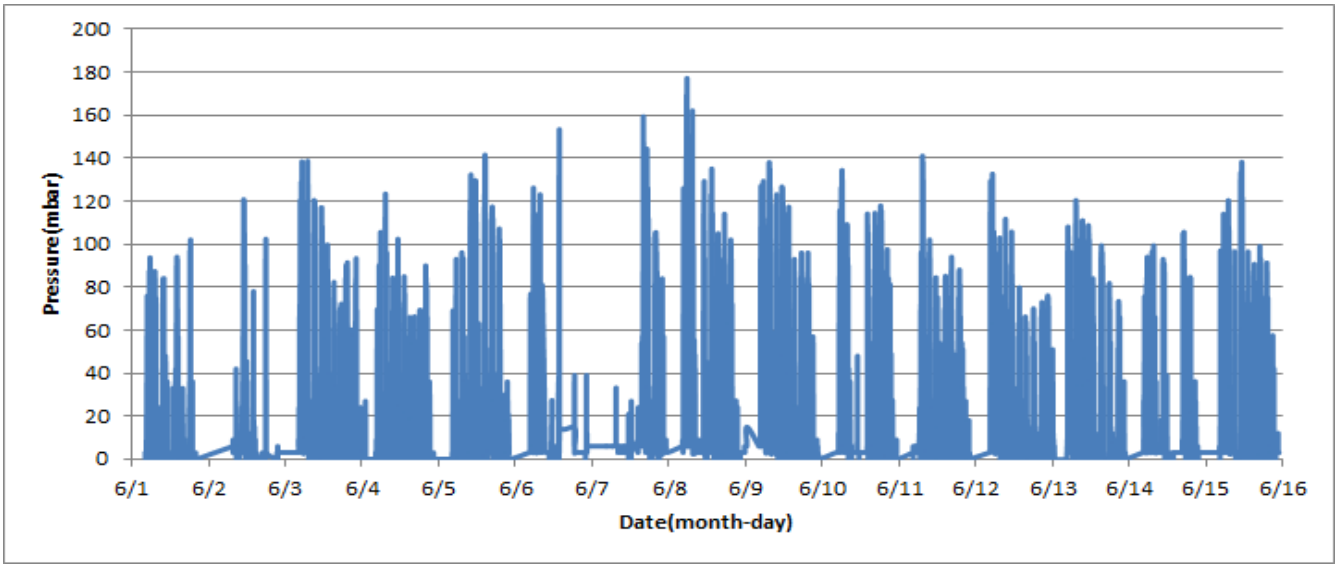


Figure 4- Pressure distribution over the fifteen days

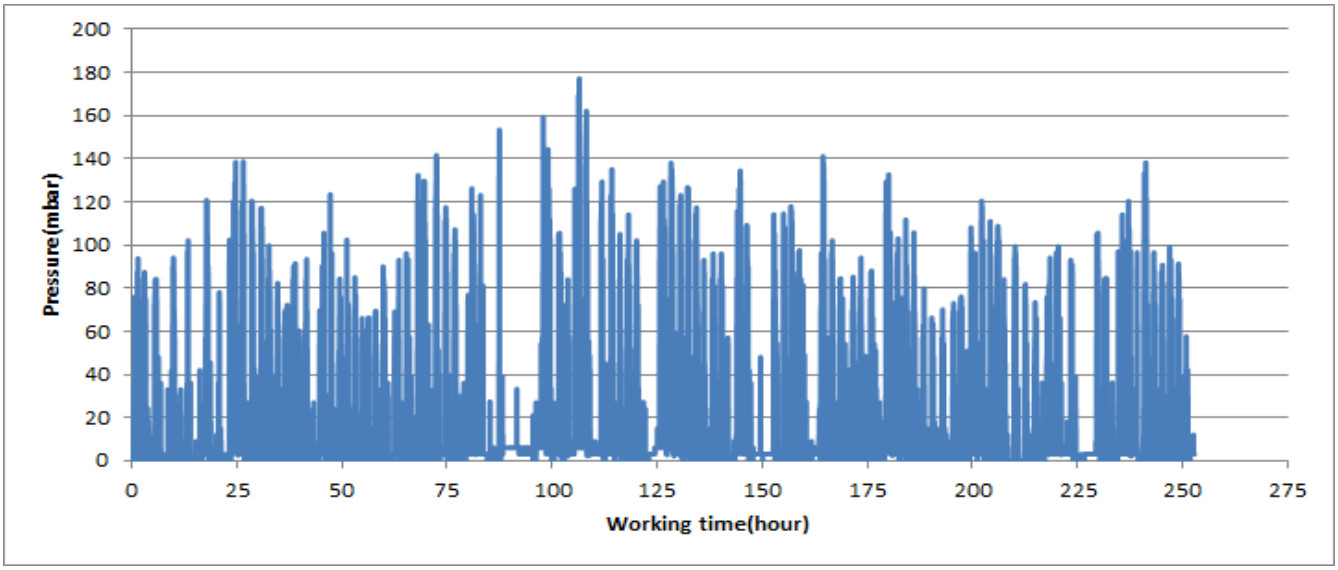


Figure 5- Pressure vs. working hours

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

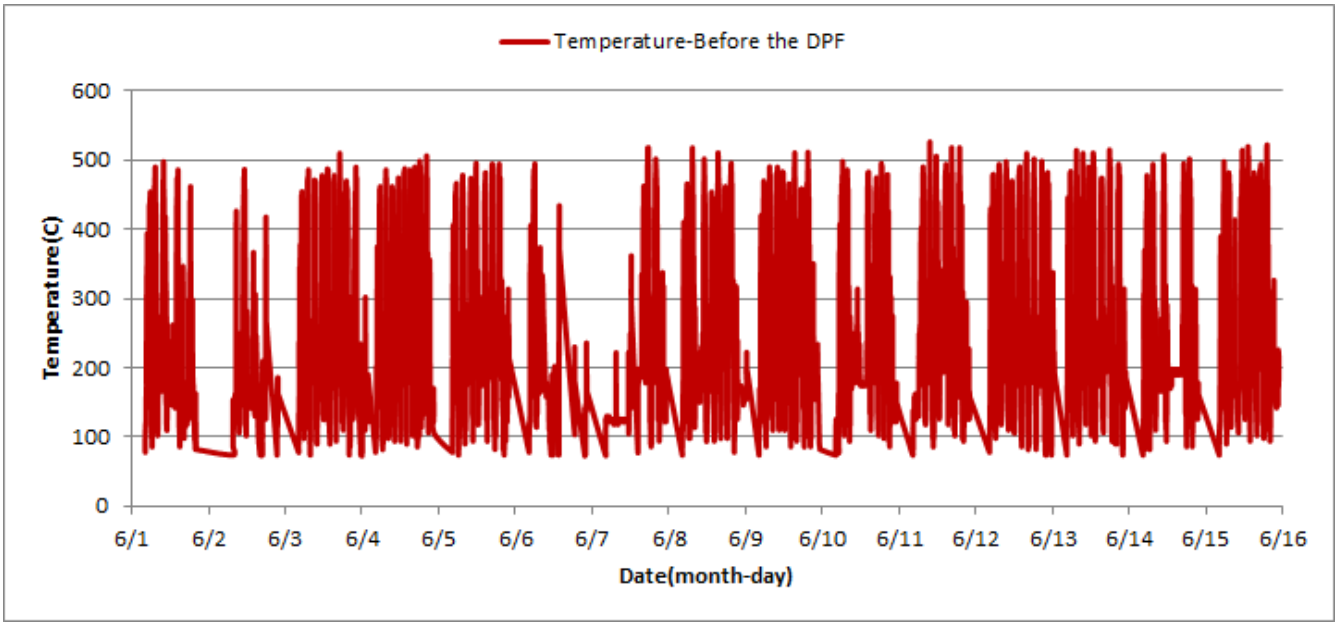


Figure 6- Temperature distribution over the fifteen days

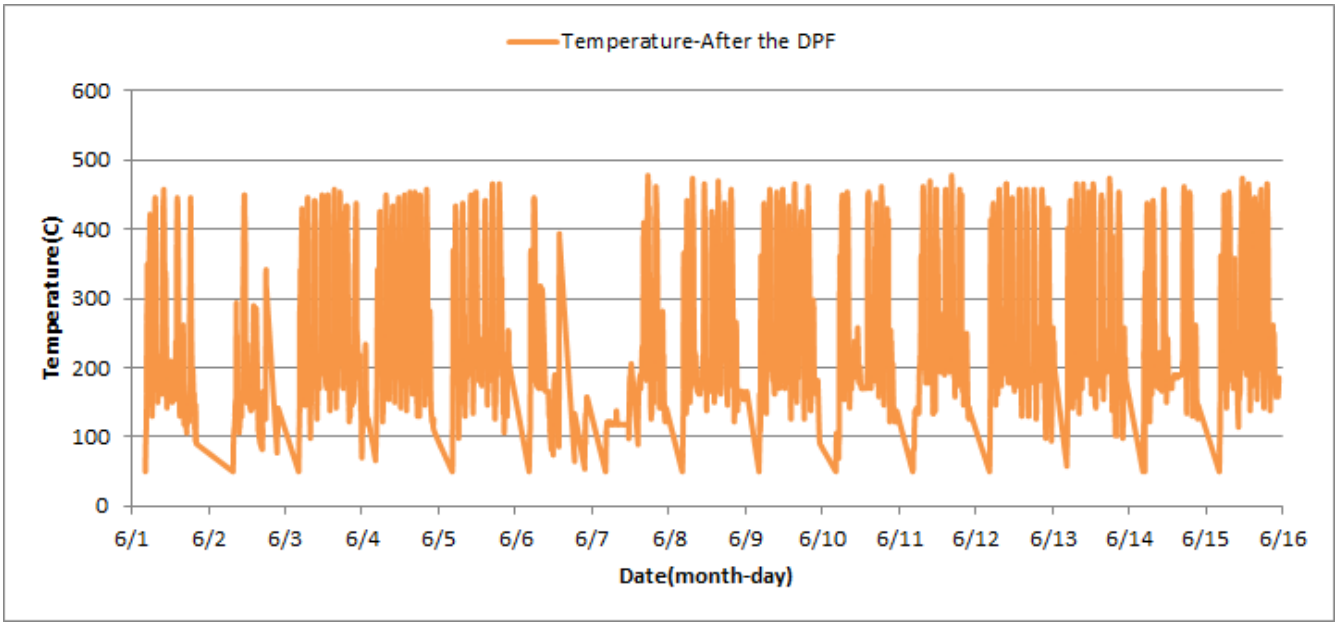


Figure 7- Temperature distribution over the fifteen days

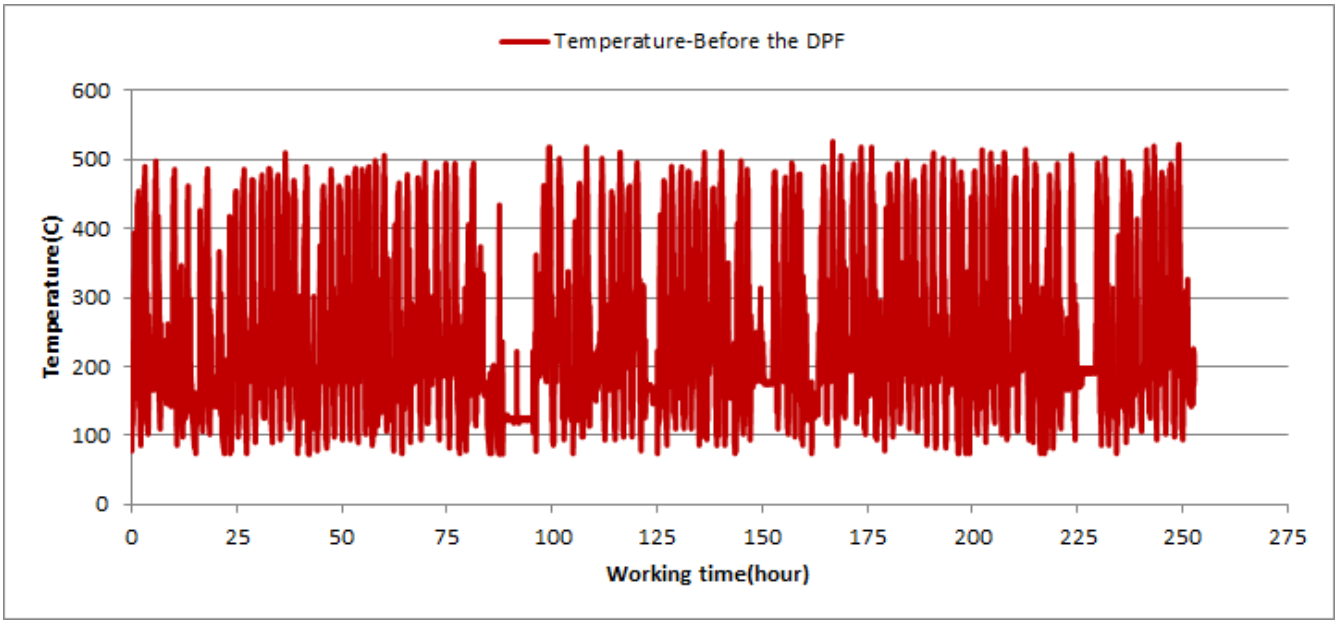


Figure 8- Temperature vs. working hours

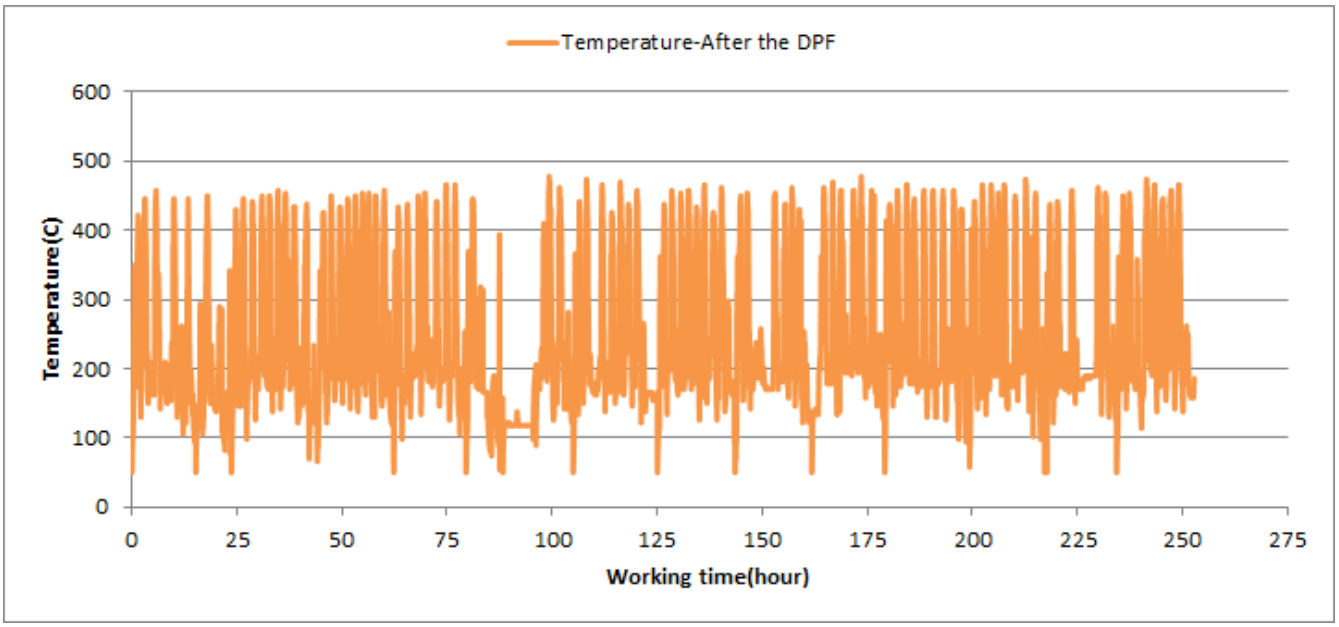


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

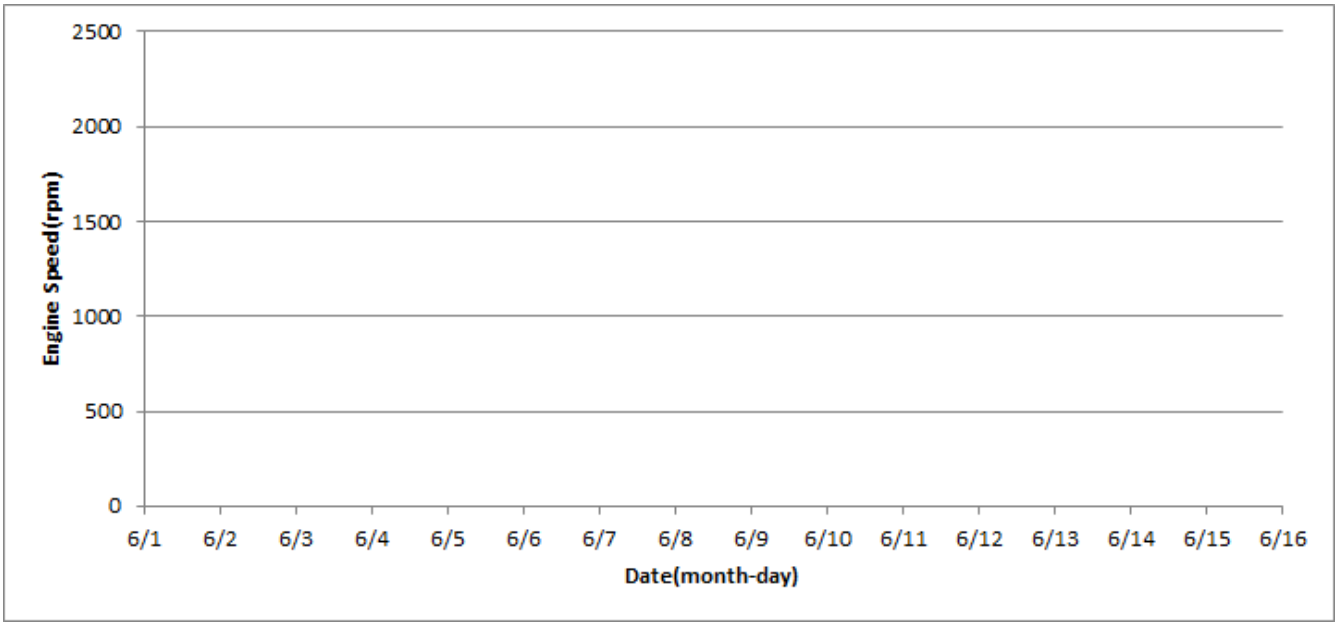


Figure 10- Engine speed distribution over the fifteen days

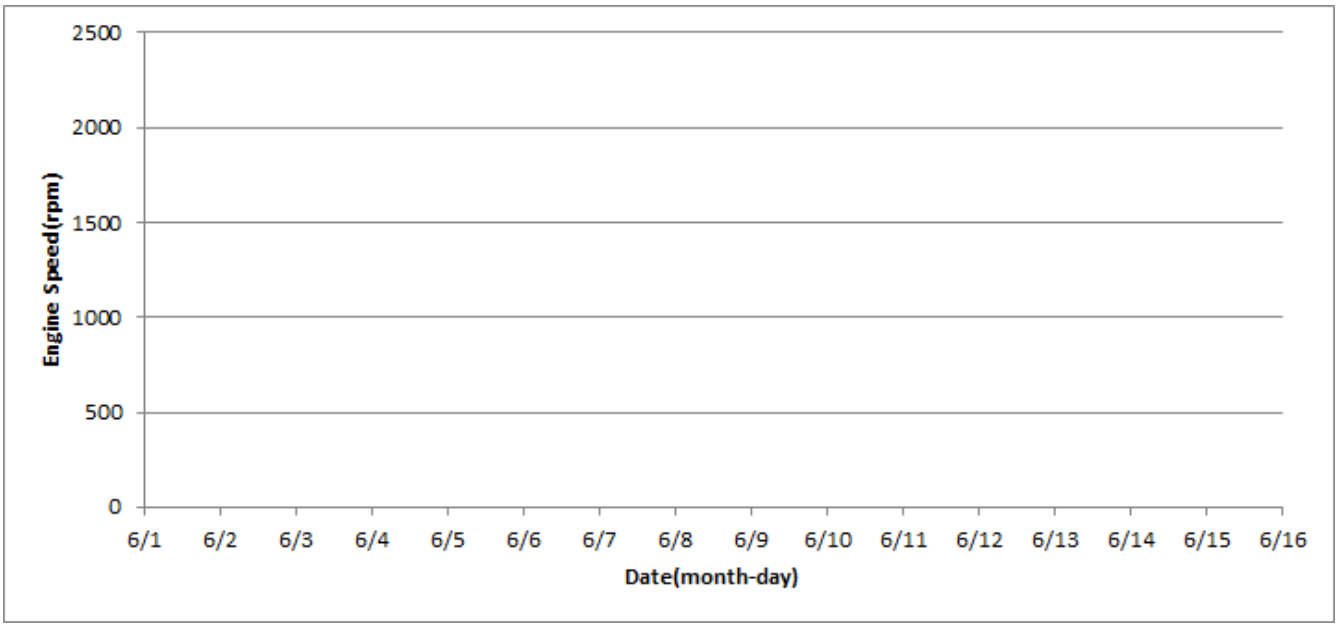


Figure 11- Engine speed diagram for calculating CPK's working days

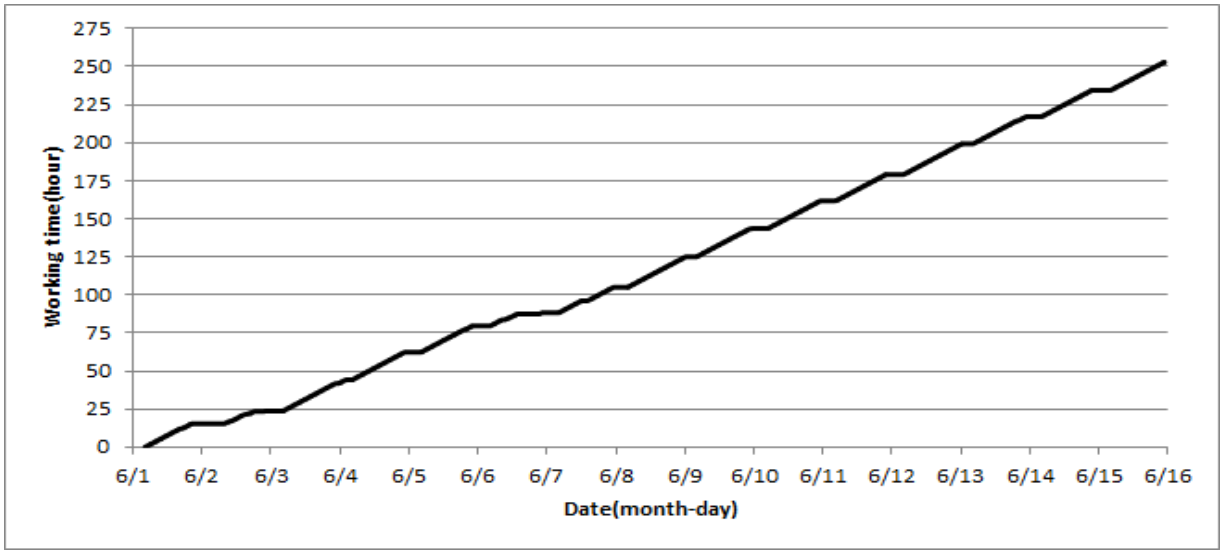


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without CPK's (data logger) data. As depicted in Figure 12, data logger sample all days of period.

Pressure-Engine Speed diagrams

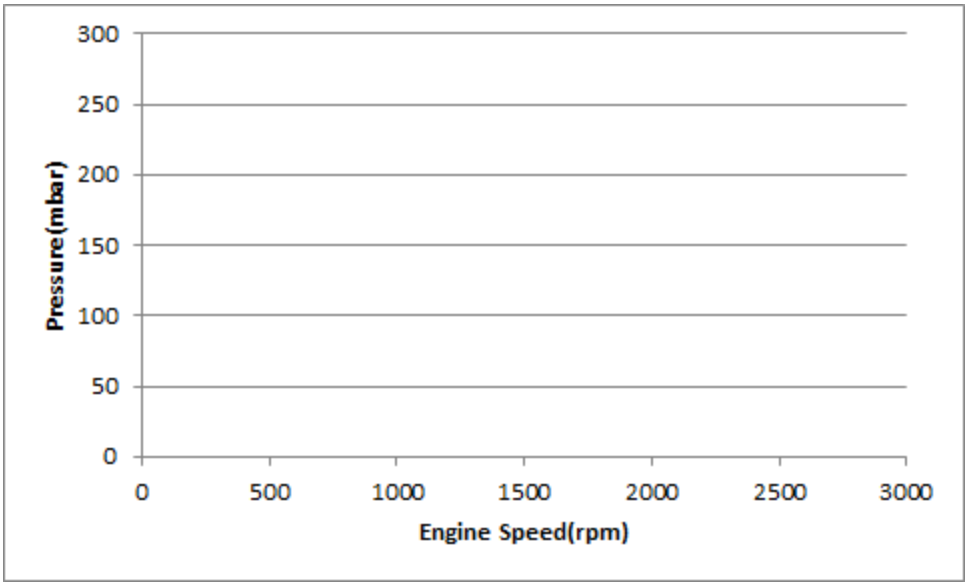


Figure 13- Pressure against engine speed

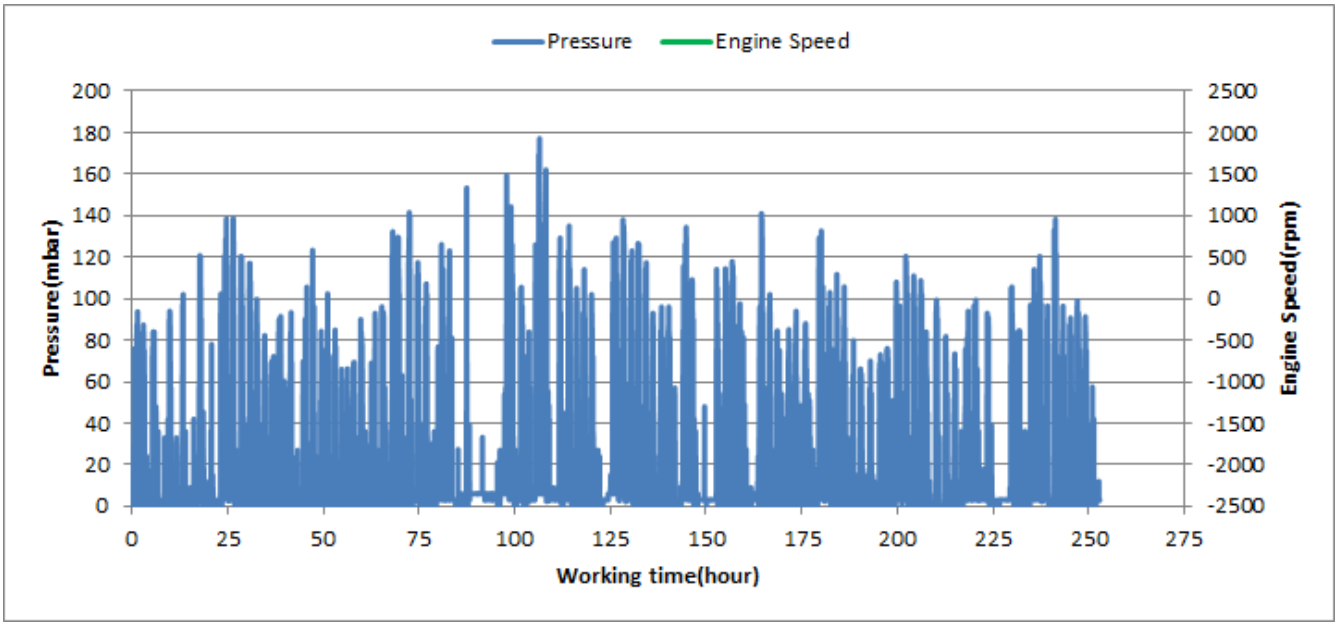


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

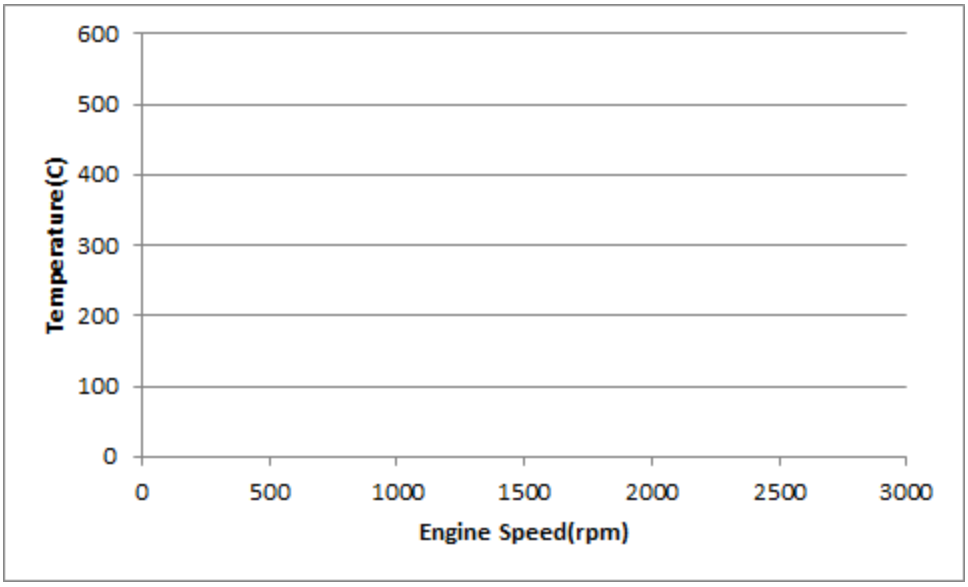


Figure 15- Temperature against engine speed

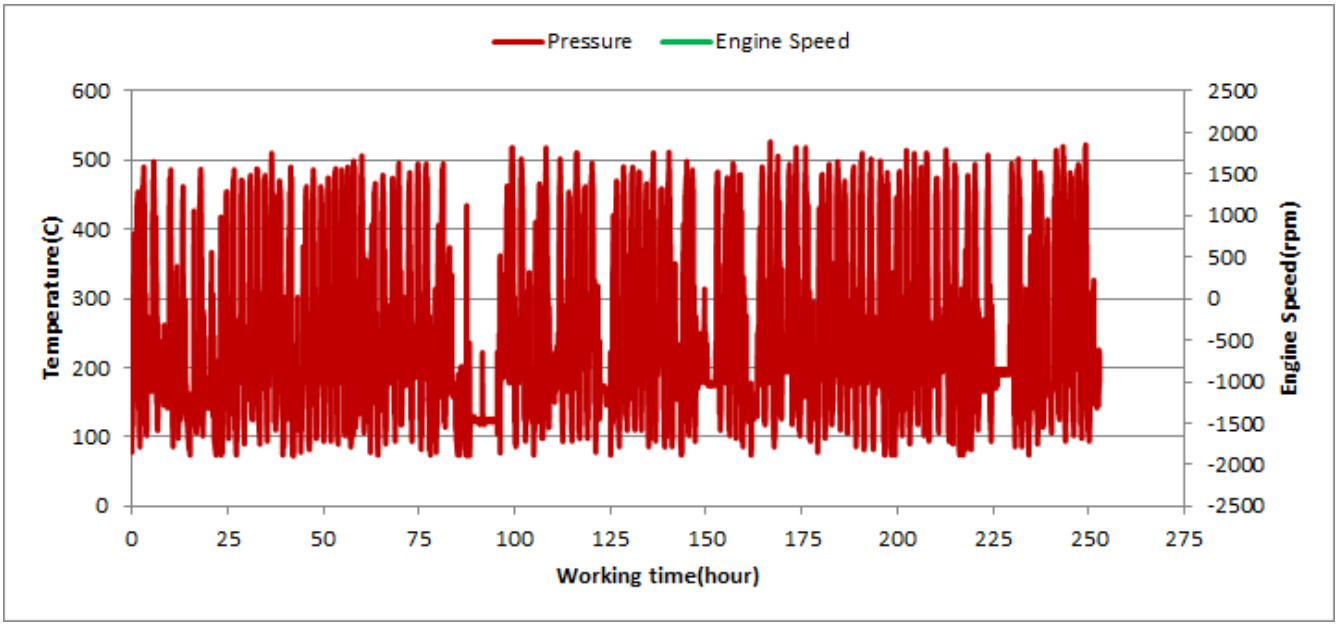


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 200 can't be observed and only 0.01% period time pressure is above 150 mbar.
- 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 17% above 350℃.

❖ **As mentioned above, engine speed sensor had problem in this period. Hence for calculating some parameters, temperature's data used instead of engine speed's data (e.g: for calculating idling time upper temperature limit was considered to be** 215 ℃**).**

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

Overall Information

Table 1- 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	HJS04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	16/Jun/2015 – 30/Jun/2015 (fifteen days)
K value – DPF's upstream	2.2 $[\mathrm{m}^{-1}]^{*}$
K value – DPF's downstream	0.03 $[m^{-1}]$

Notice: The K value for filter's upstream was high, because K value had been measured a day before bus oil service was done.

Table 2- Maintenance Table

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)	19449 km
Bus mileage over the period	2445 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	225 hours, 40 minutes
Average working hours per day (including stop days)	15 hours, 3 minutes
Bus average speed	10.83 km/hr
Idle speed time to all working time ration	52%*
Total bus fuel consumption over the period	1562 lit
Fuel consumption per hour	6.92 lit/hr
Average fuel consumption	0.63 lit/km
Total bus additive consumption over the period	0.65 lit
Average additive consumption	0.265 cc/km
Additive consumption to fuel ration	416 cc per 1000 lit (batch dosing with tank level)

Notice: Due to rpm sensor's problem temperature data were used for calculating idle speed time instead of engine speed data.

Temperature, Pressure and Engine Speed Overview

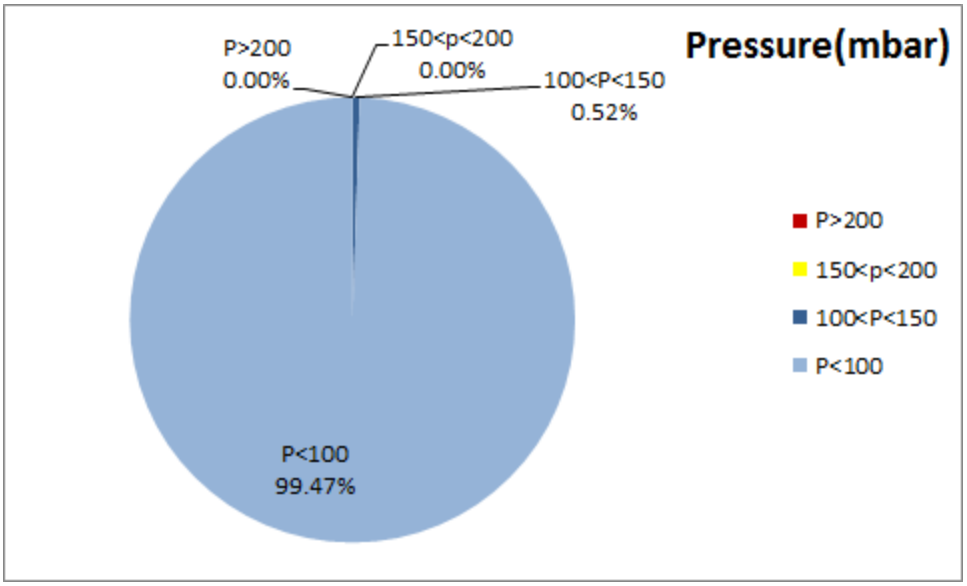


Figure 1- Pressure distribution over the working hours

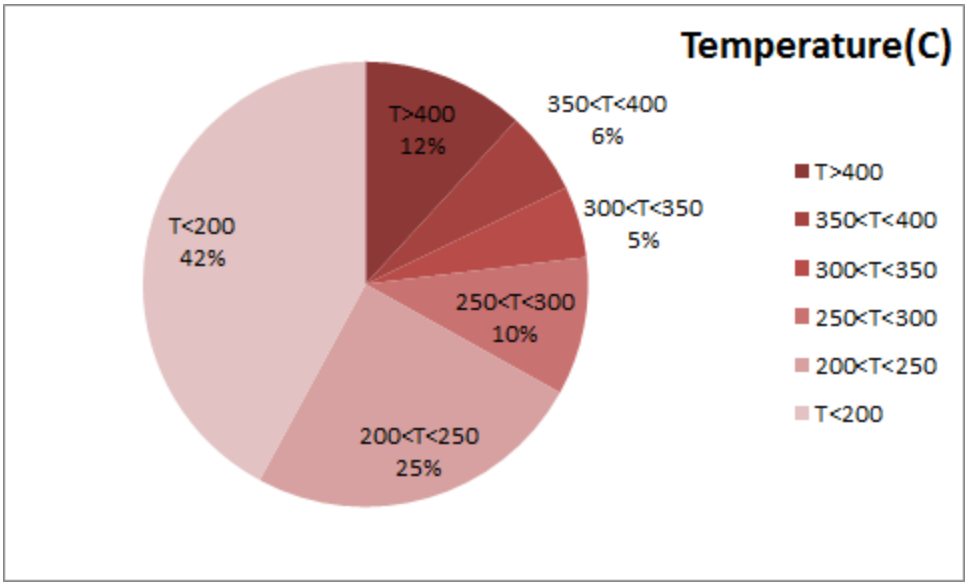


Figure 2-Temperature[1] distribution over the working hours

[1] - Flow temperature (DPF's upstream)

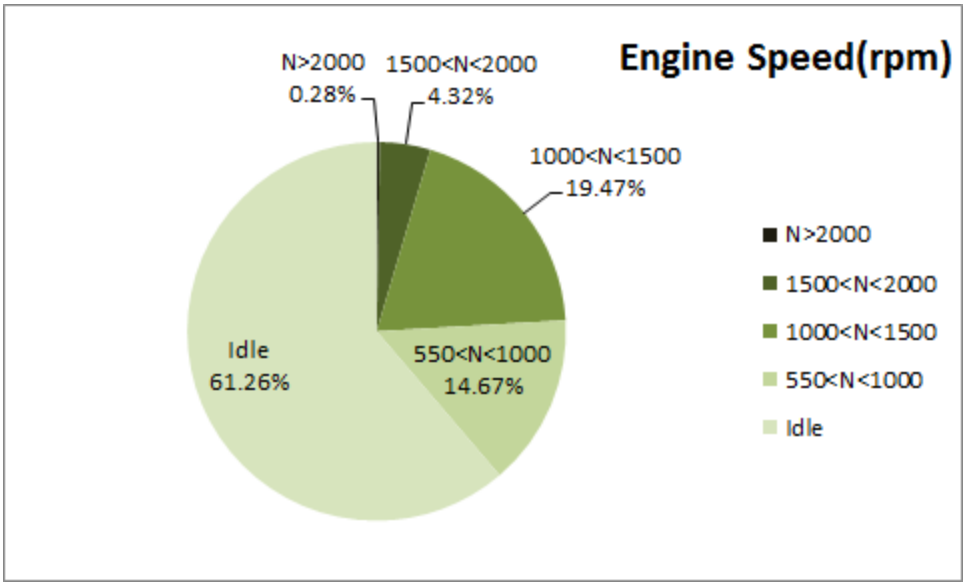


Figure 3- Engine speed distribution over the working hours

Notice: RPM sensor was fixed on Jun 23th, so figures and numbers related to engine speed related to data after this date.

Notice: This vehicle cooler system was not used during this period. So upper limit for idle engine speed was considered to be 550 rpm.

Table 3- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
241.90	12.59	755

Table 4- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
319.66	21.35	873

Table 5- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
542-70	153-0	2256-0

[2] - Flow temperature (DPF's upstream)

Detailed Pressure Analysis

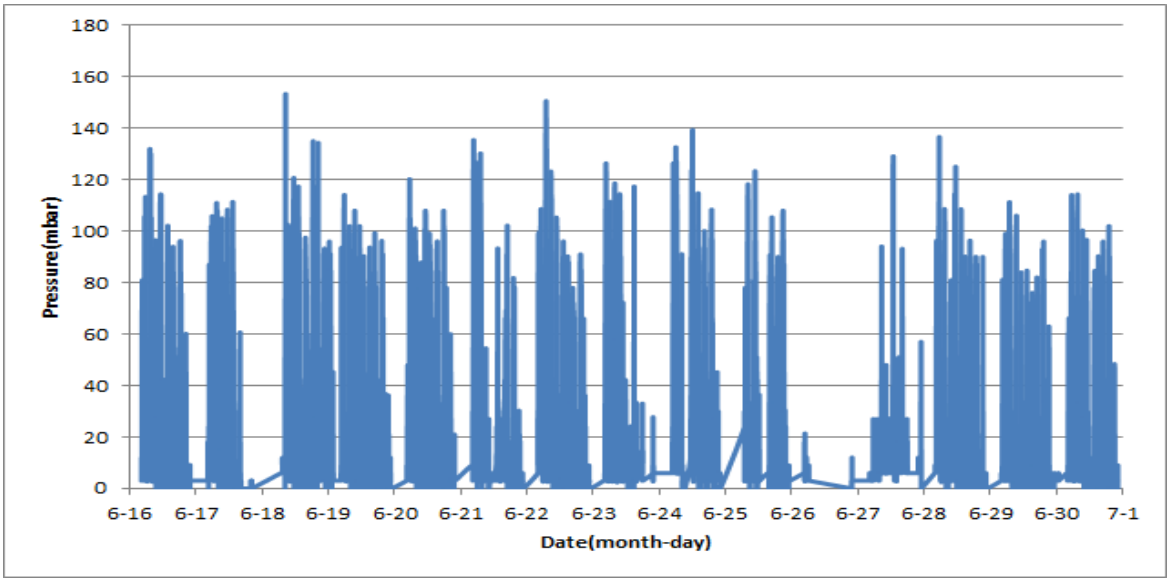


Figure 4- Pressure distribution over the fifteen days

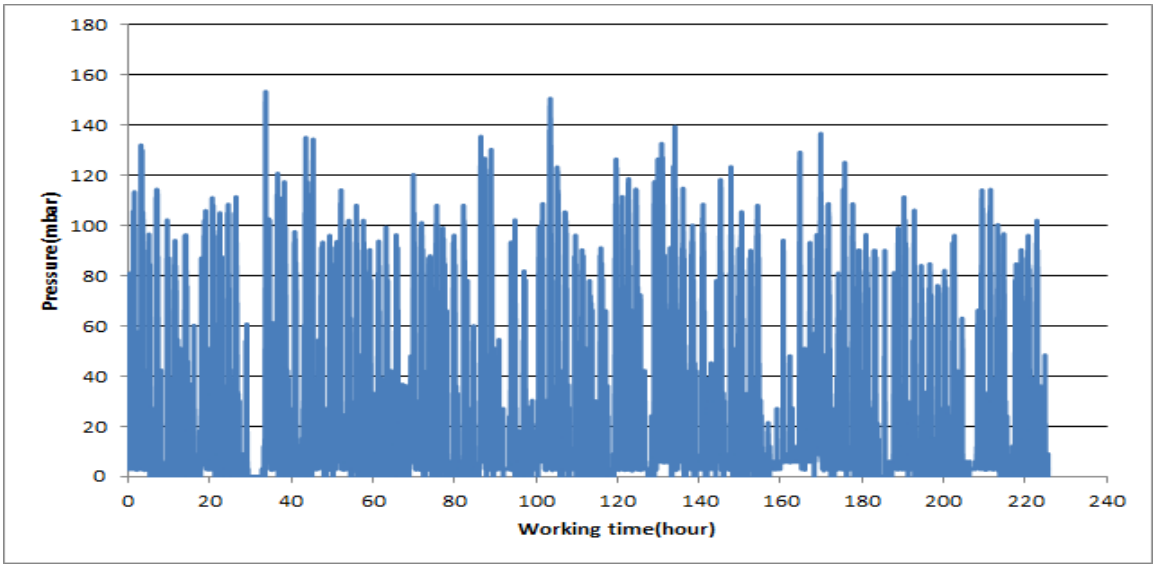


Figure 5- Pressure vs. working hours

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

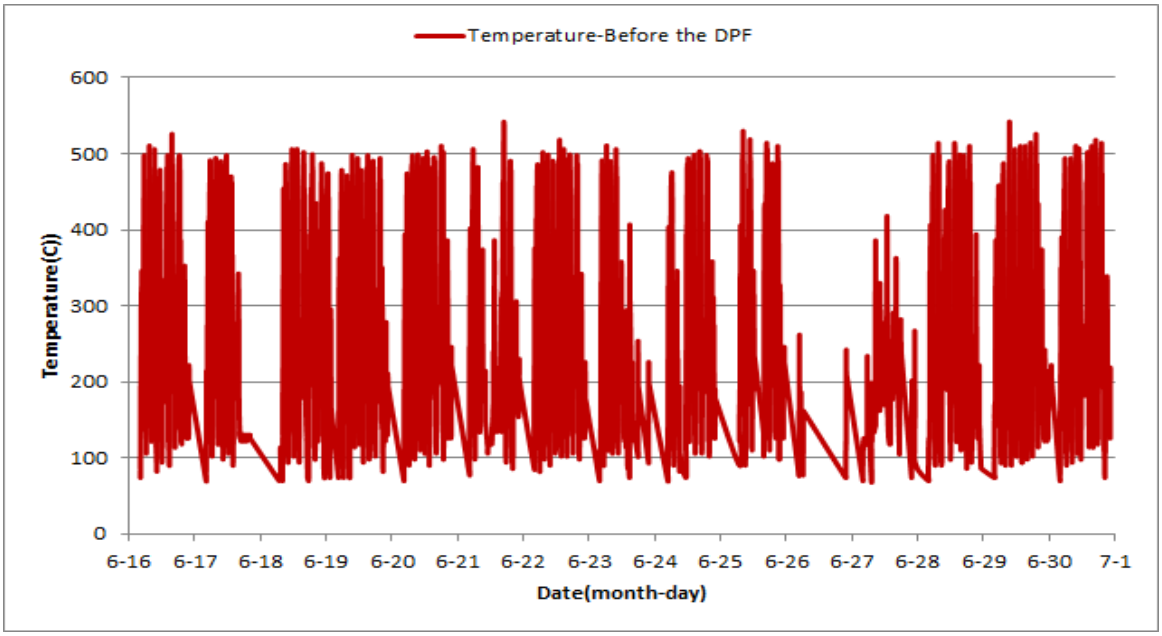


Figure 6- Temperature distribution over the fifteen days

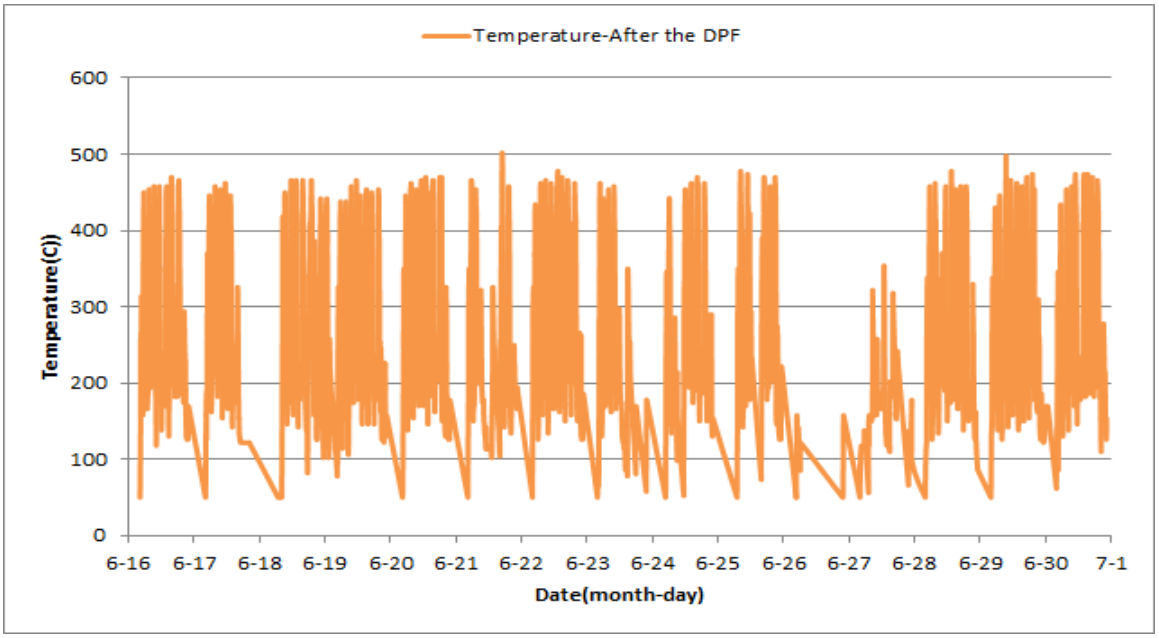


Figure 7- Temperature distribution over the fifteen days

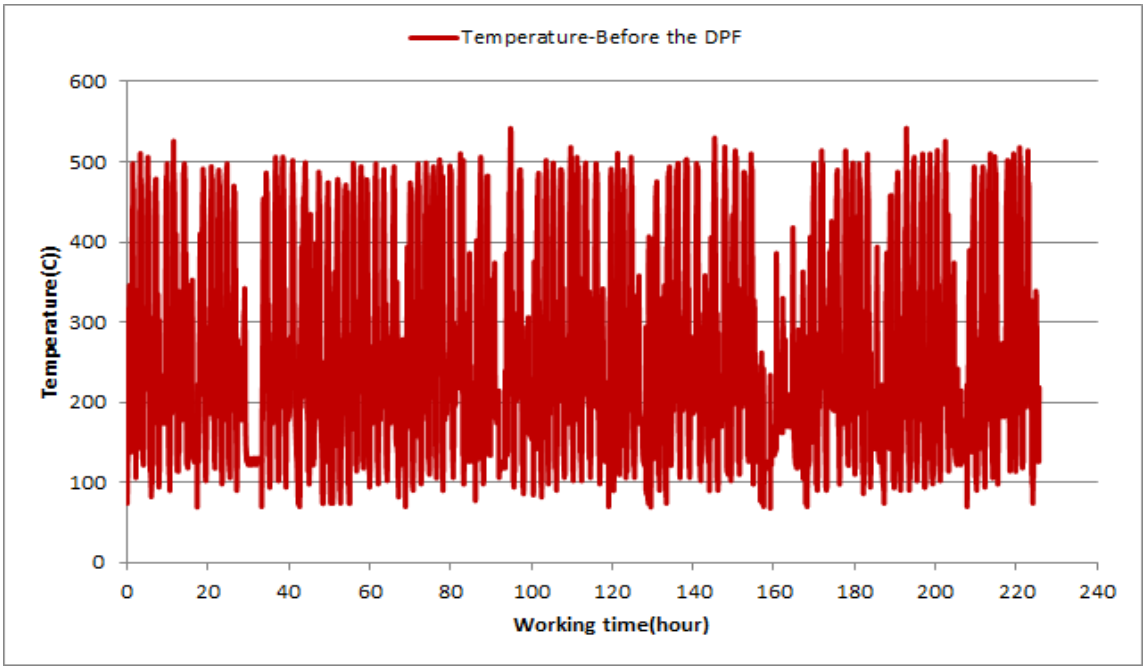


Figure 8- Temperature vs. working hours

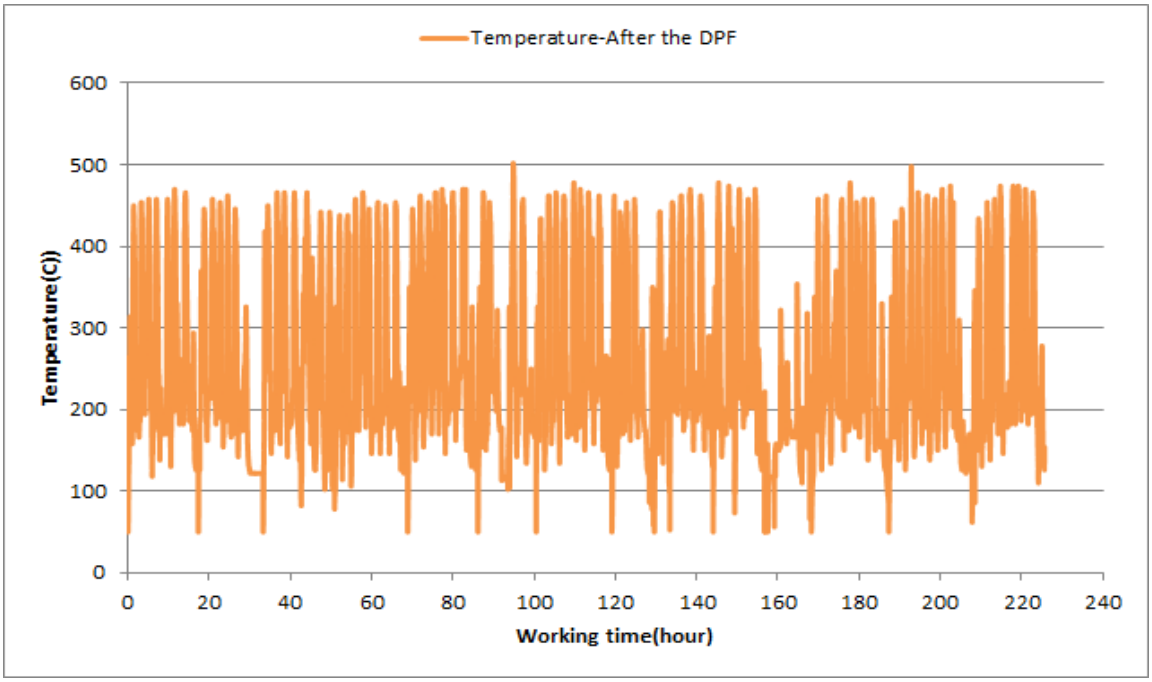


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

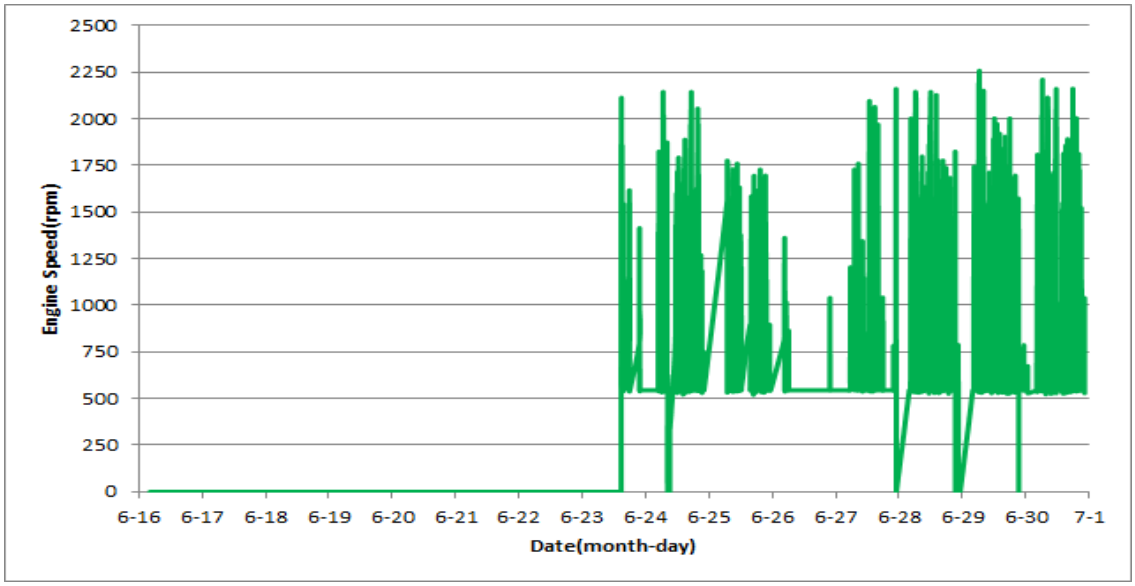


Figure 10- Engine speed distribution over the fifteen days

Notice: Figures related to engine speed show zero value before Jun 23th due to rpm sensor's problem.

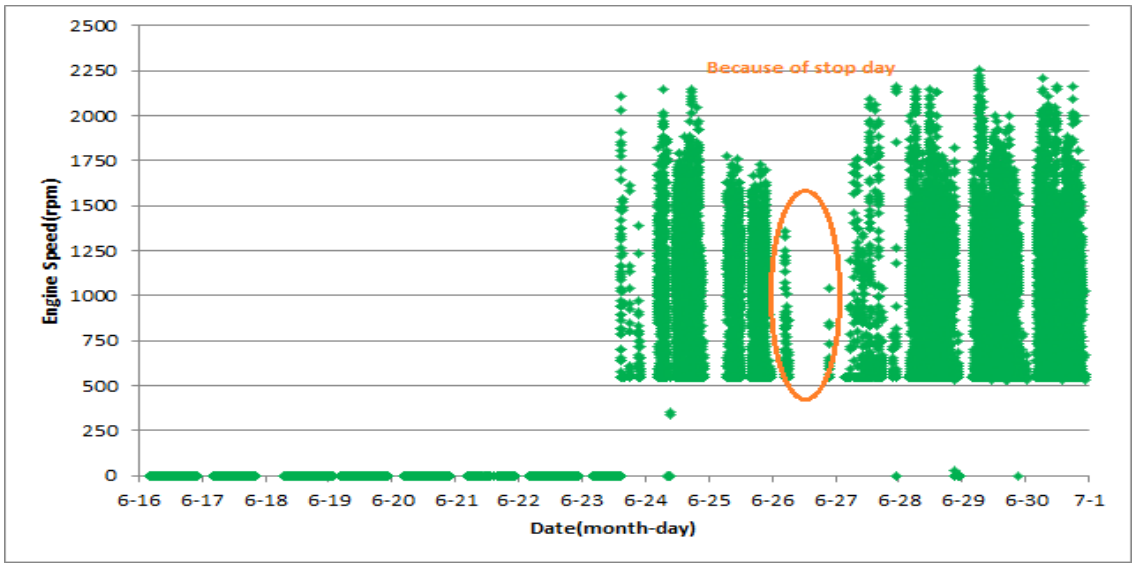


Figure 11- Engine speed diagram for calculating CPK's working days

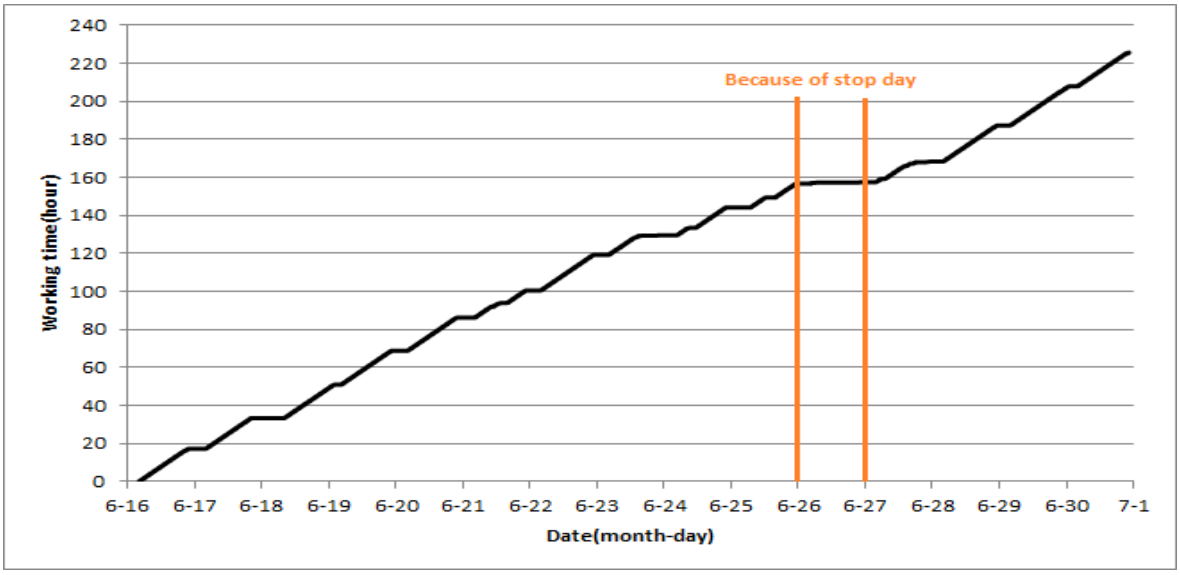


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without CPK's (data logger) data. As depicted in Figure 12, data logger sample all days of period.

Pressure-Engine Speed diagrams

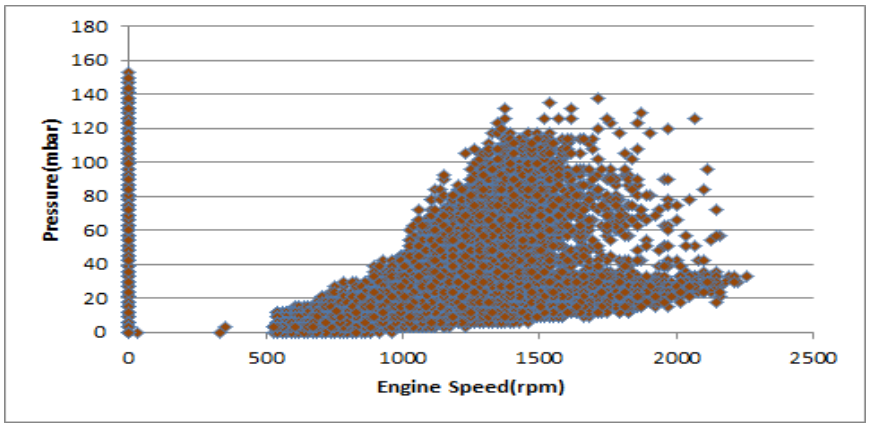


Figure 13- Pressure against engine speed

Notice: The line parallel with pressure axis related to rpm sensor problem. (fixed on 23th Jun)

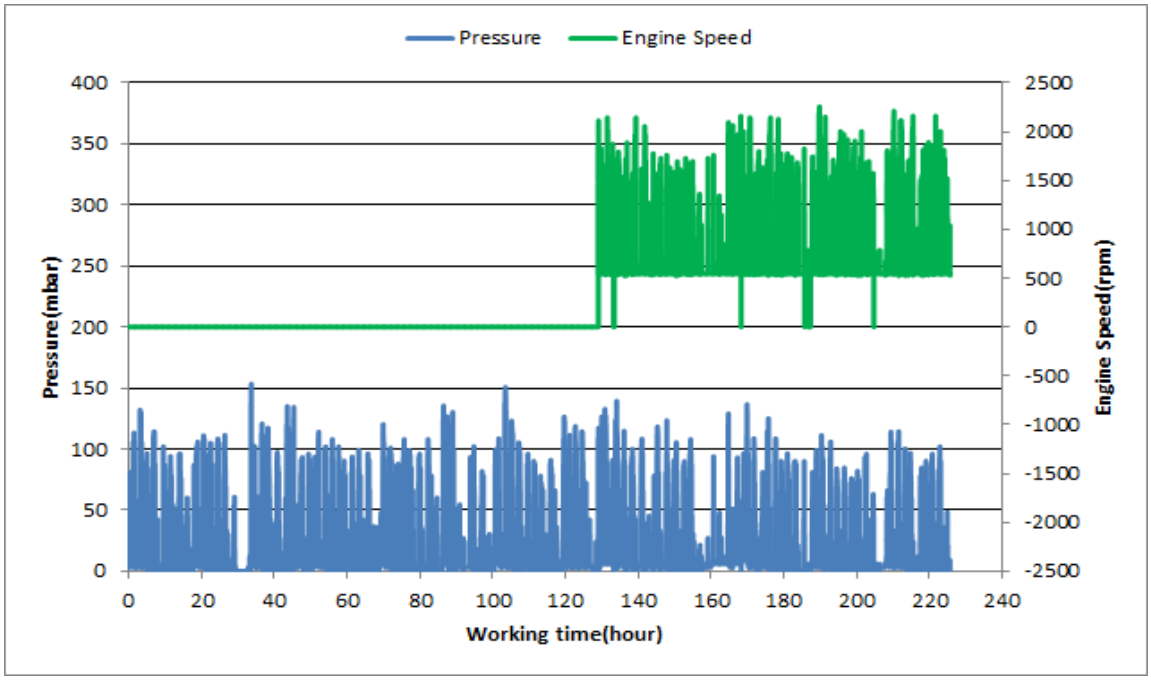


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

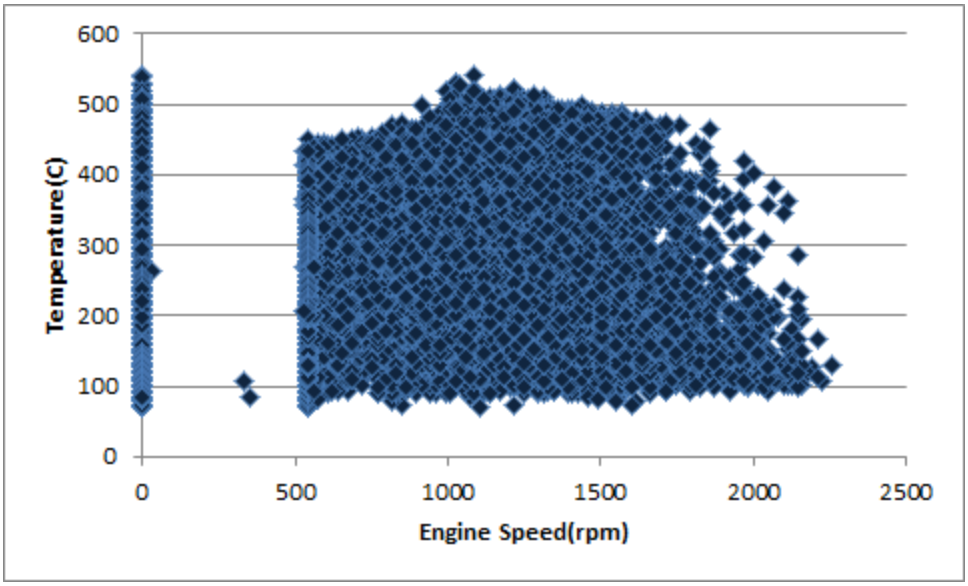


Figure 15- Temperature against engine speed

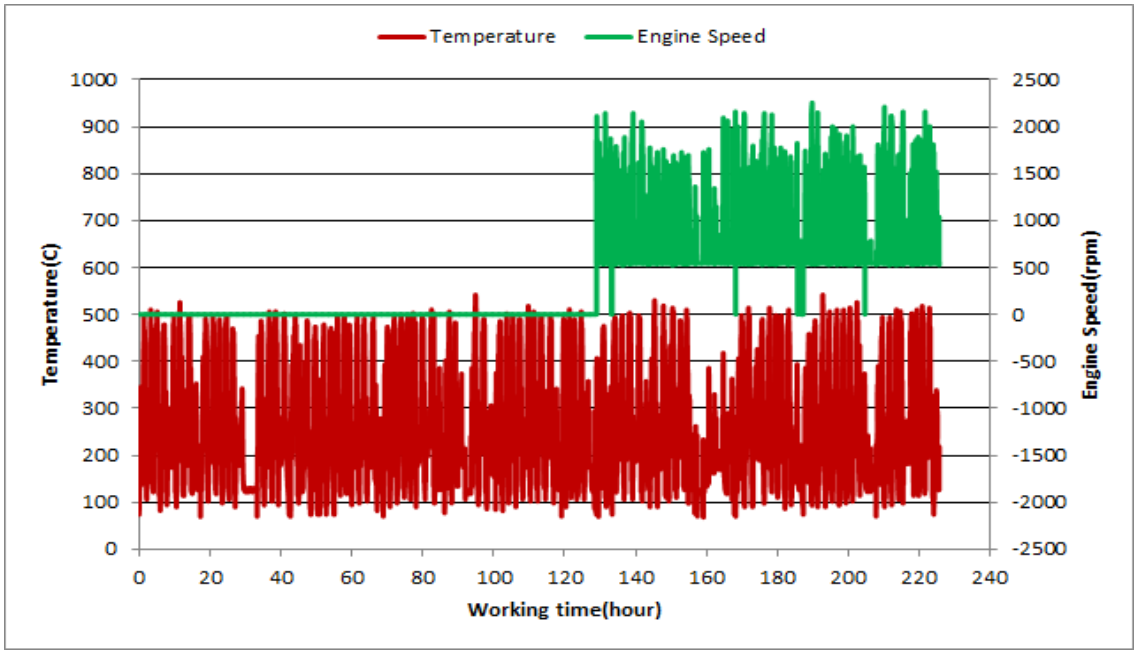


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 150 can't be observed.
- 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 18% above 350℃.

❖ **As mentioned above, engine speed sensor had problem in this period. Hence for calculating some data temperature data used instead of engine speed data (e.g: for calculating idling time upper temperature limit was considered to be** 215 ℃**).**

❖ **RPM sensor was fixed on Jun23th.**

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

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