DPF FEASIBLITY STUDY REPORT

TEHRAN-IRAN

DPFs' Monthly Operation Report

Report Period: 01/May/2015 – 31/May/2015 (third edition)

Documents Number: DPF2015051/3, DPF215052/3

Contents:
Results Overview
Detailed Reports

Installed DPFs:

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

AZMOON SANAT ARVIN
Suite 10 | No. 25 | Nahal Alley | Koodak Square | Kashani Blvd | Tehran – Iran | Postal Code 1474613714

Phone (+9821) 44360051-2
Fax (+9821) 44360053

www.ASArvin.com
Info@asarvin.com

AZMOON SANAT ARVIN	Document Numbers: DPF2015051/3 DPF2015052/3

DPFs' Operation Results Overview

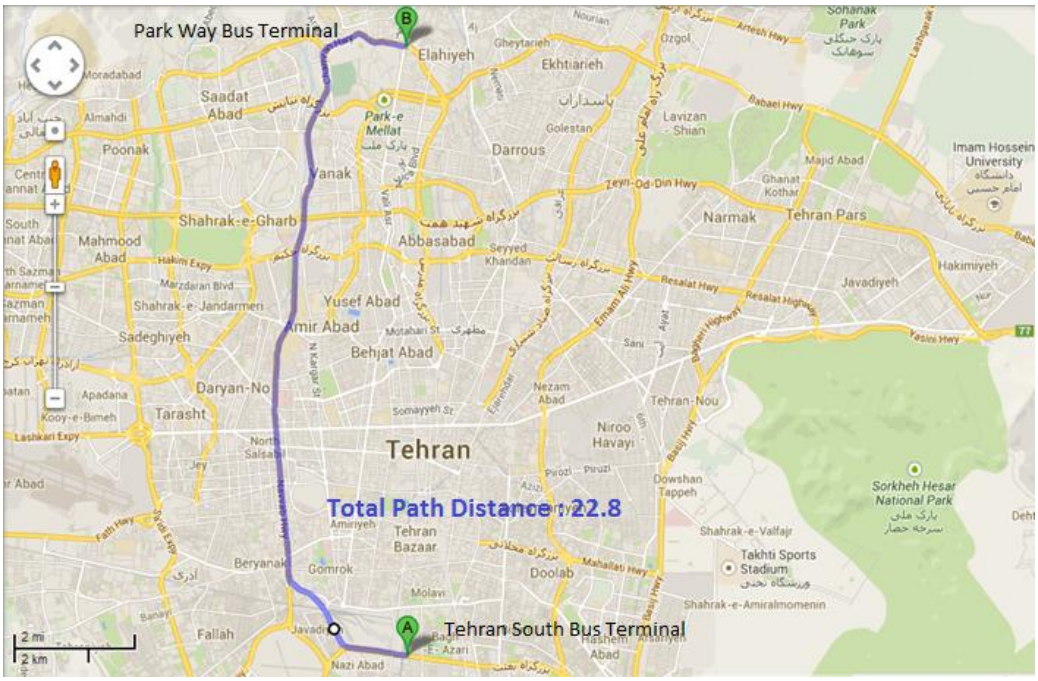
Vehicle ID	DPF Producer Company	Operation Status	Operation Status
		May/01/2015 - May/15/2015	May/16/2015 - May/31/2015
78514 (line 4)	HJS_01 (Passive system with FBC)	**1**	**2**
85423 (line 4)	HJS _02 (Active system with FBC - Electrical Heater)	**1**	**1**
78515 (line 4)	Dinex_01 (Passive system with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

All right reserved by ASA company – confidential no passing to third parties.

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



All right reserved by ASA company – confidential no passing to third parties.

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/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.24 $[m^{-1}]$
K value – DPF downstream	0.06 $[m^{-1}]$

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.

All right reserved by ASA company – confidental no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	34653 km
Bus mileage over the period	2622 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	12 days
Working hours over the period	148.70+3*12.39=185.88 hours
Average working hours per day (including stop days)	12.39 hours
Bus average speed	16.50 km/hr
idle speed time to all working time ration	47%
Total Bus fuel consumption over the period	1708 lit
fuel consumption per hour	9.19 lit/hr
Average fuel consumption	0.65 lit/km
Total Bus additive consumption over the period	0.73 lit
Average additive consumption	0.280 cc/km
additive consumption to fuel ration	430 cc per 1000 lit (Batch Dosing with Tank Level)

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

All right reserved by ASA company – confidental no passing to third parties.

Temperature, Pressure and Engine Speed Overview

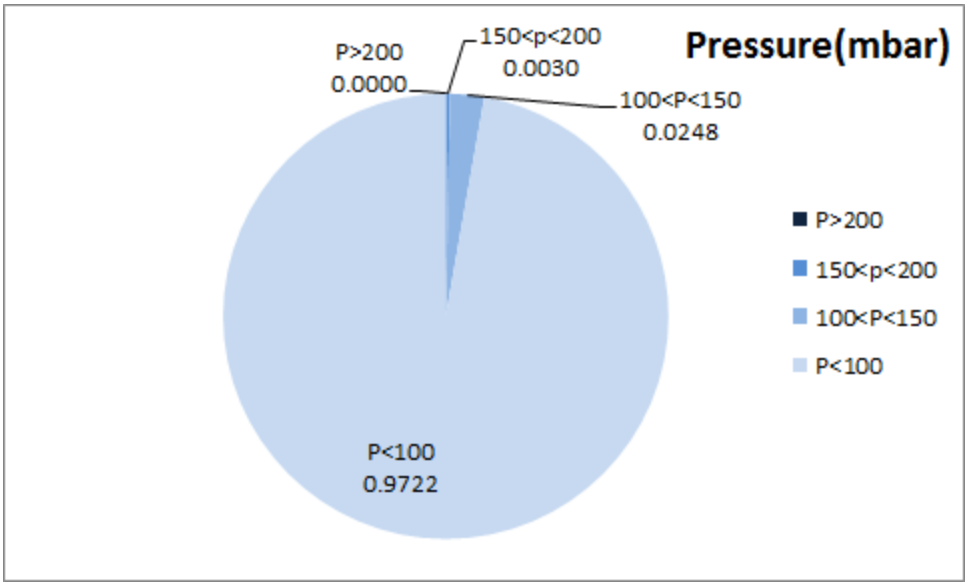


Figure 1- Pressure distribution over the working hours

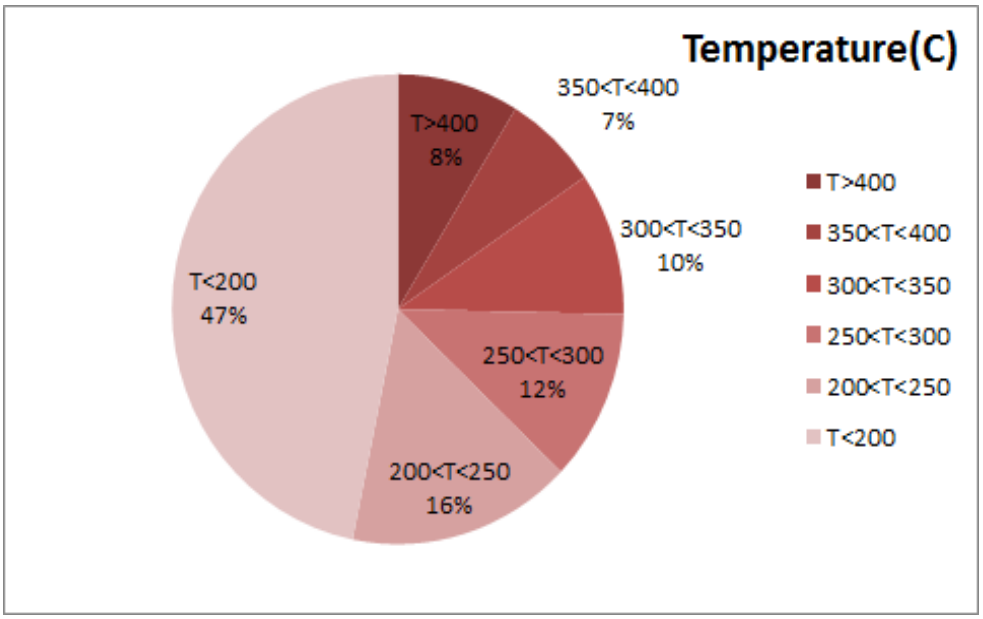


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidental no passing to third parties.

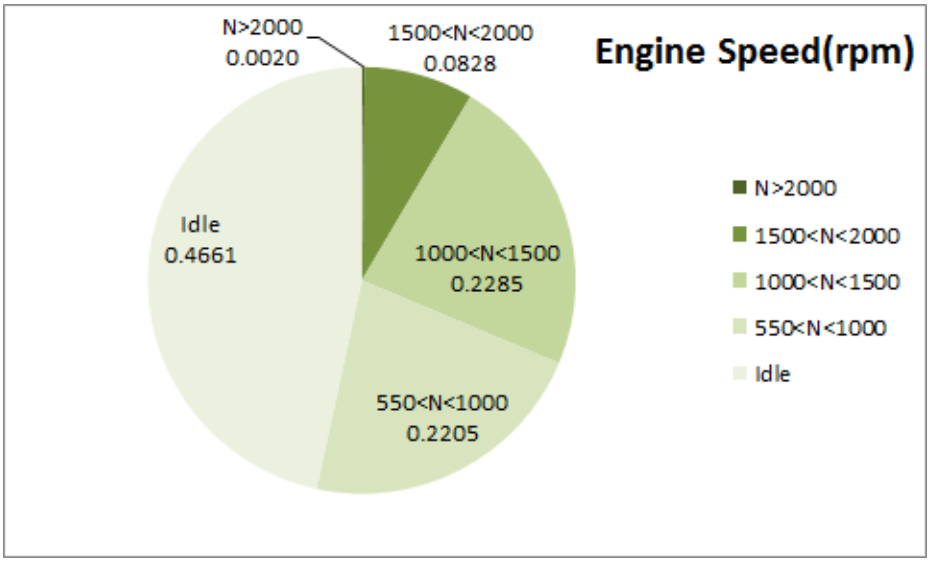


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
235.63	18.26	843

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
290.36	30.90	1103

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
670-50	189-0	2240-272

[2] - Temperature of before the DPF

All right reserved by ASA company – confidental no passing to third parties.

Detailed Pressure Analysis

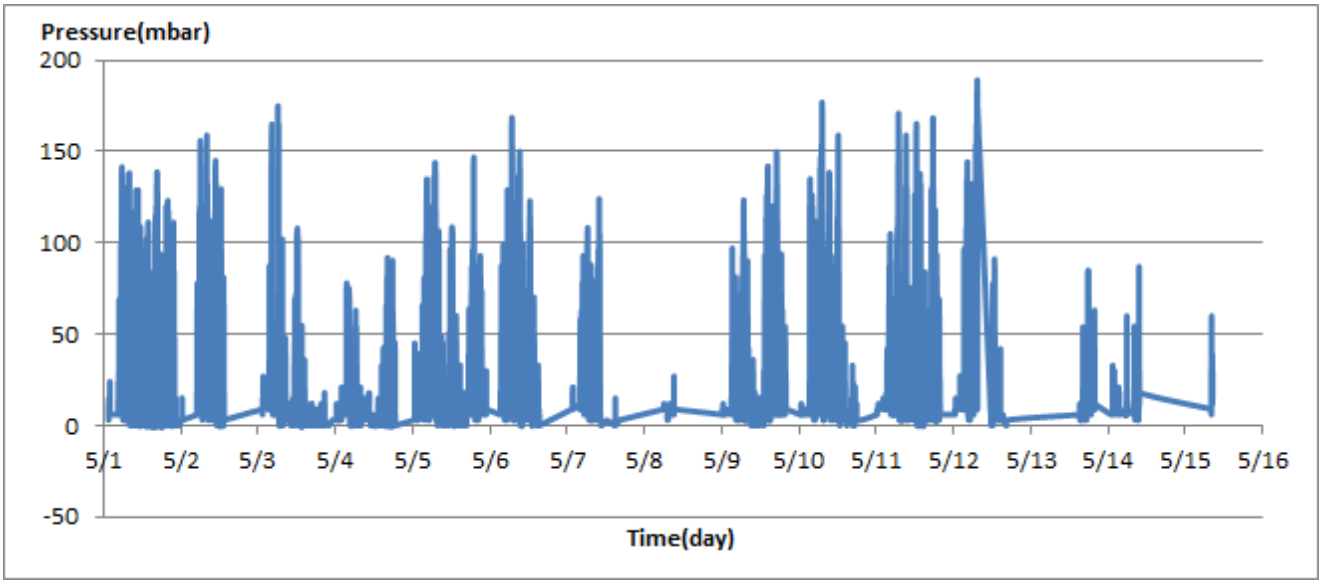


Figure 4- Pressure distribution over fifteen days

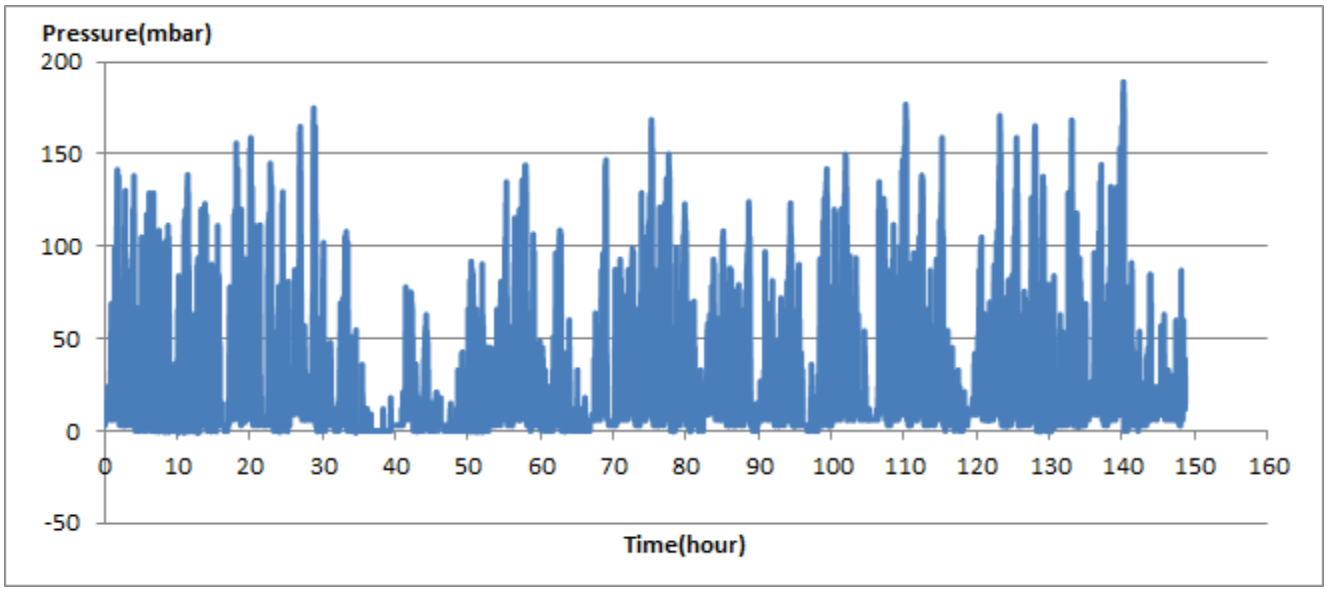


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidental no passing to third parties.

Detailed Temperature Analysis

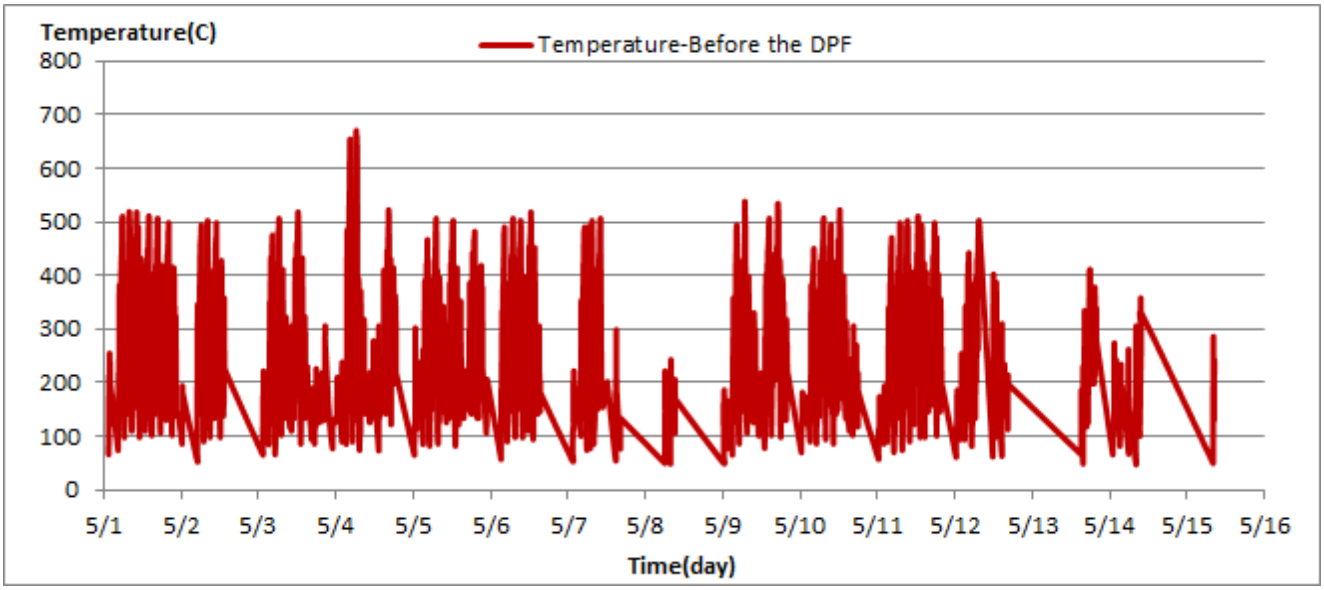


Figure 6- Temperature distribution over fifteen days

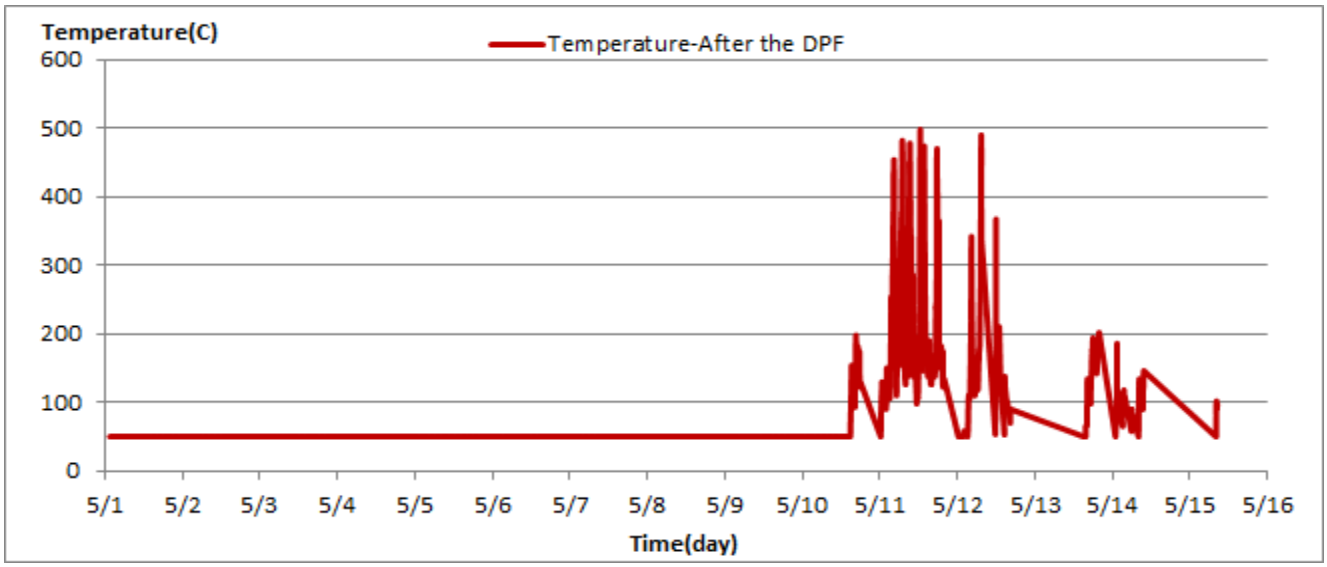


Figure 7- Temperature distribution over fifteen days

Notice: Temperature sensor for after the DPF installed on May 10th, so before this date CPK's showed 50°C.

All right reserved by ASA company – confidental no passing to third parties.

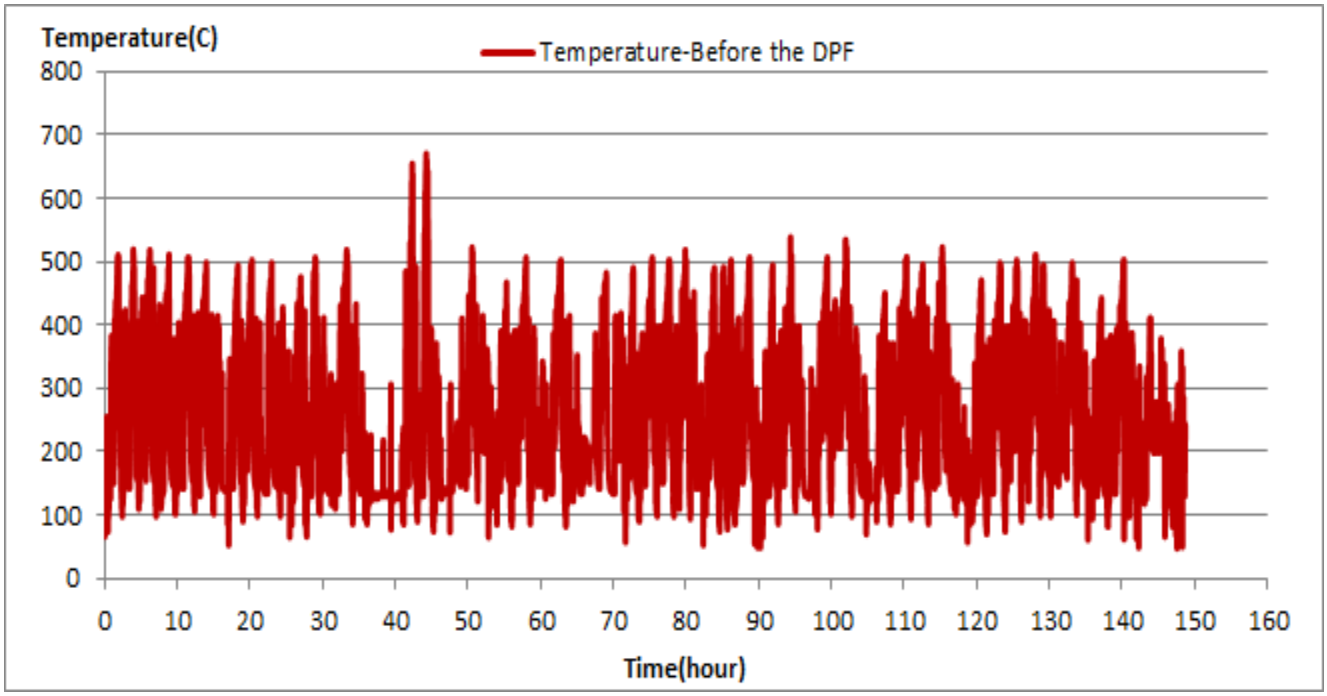


Figure 8- Before DPF temperature vs. working hours

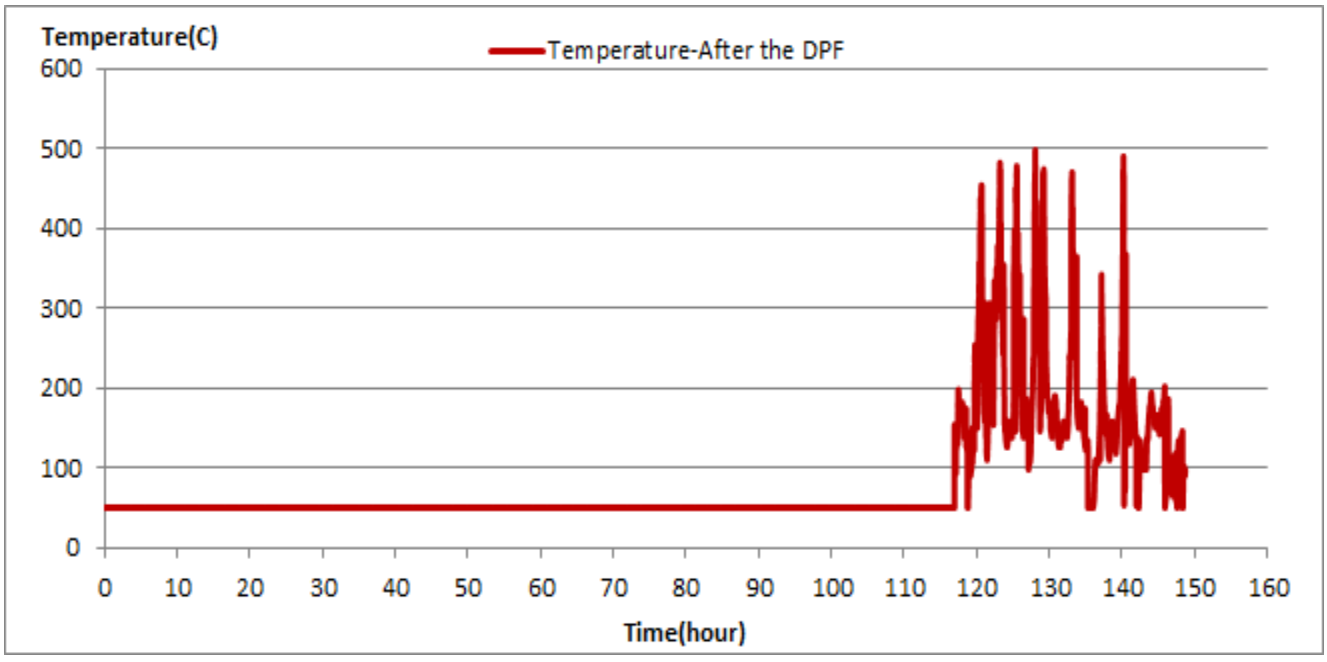


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidental no passing to third parties.

Engine Speed Diagrams

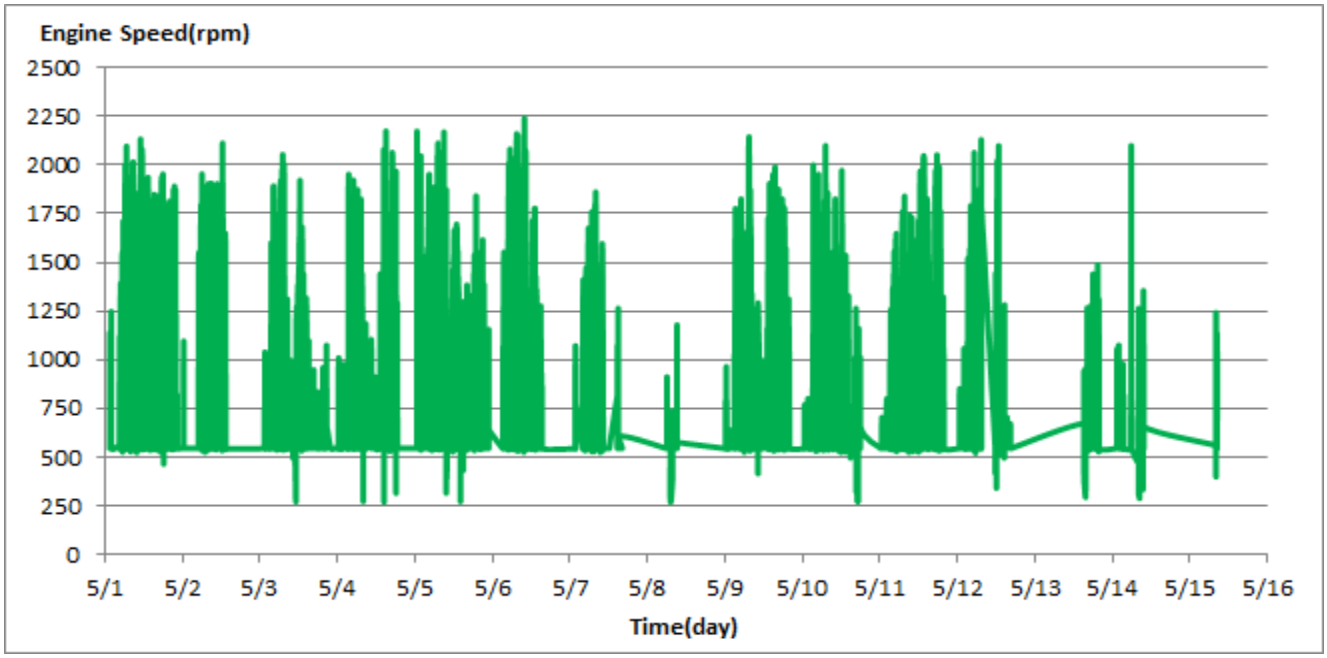


Figure 10- Engine speed distribution over fifteen days

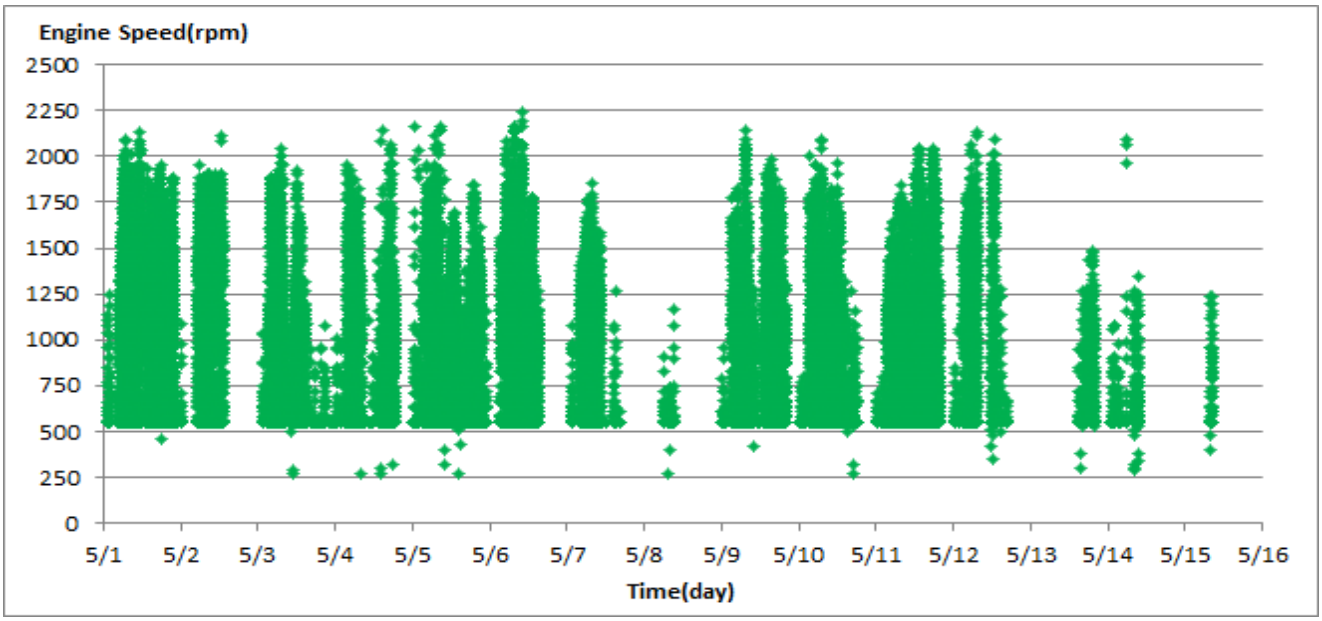


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidental no passing to third parties.

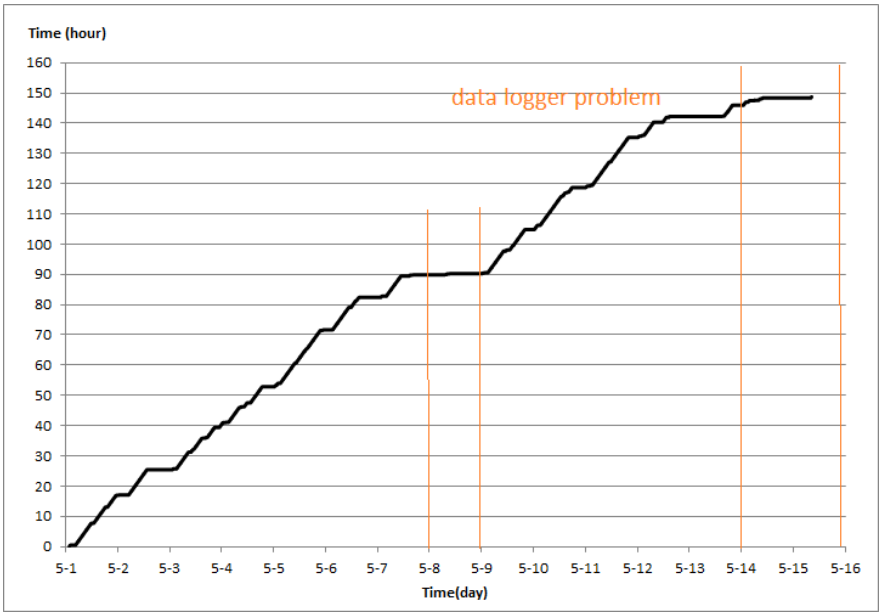


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

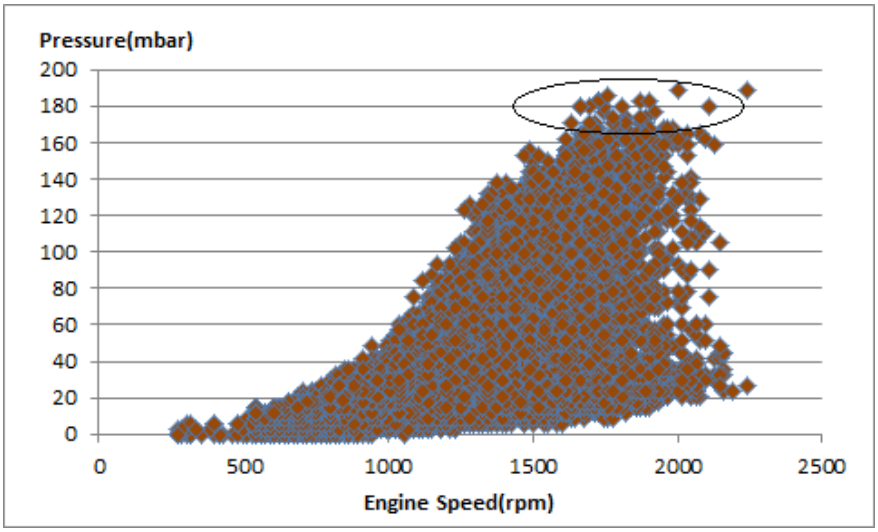


Figure 13- Pressure against speed

All right reserved by ASA company – confidental no passing to third parties.

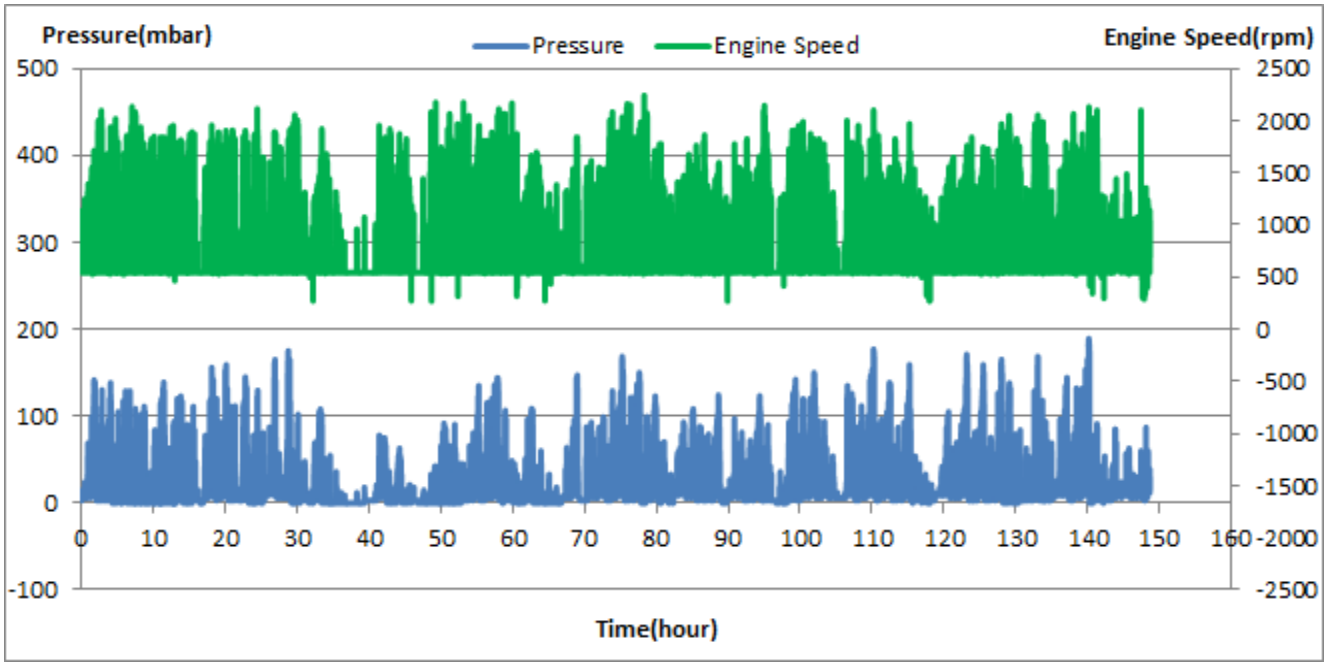


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

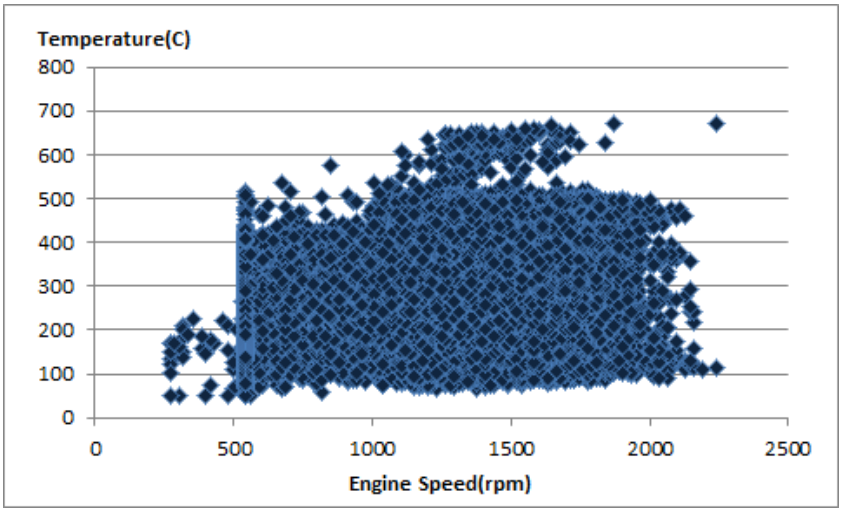


Figure 15- Temperature against speed

All right reserved by ASA company – confidental no passing to third parties.

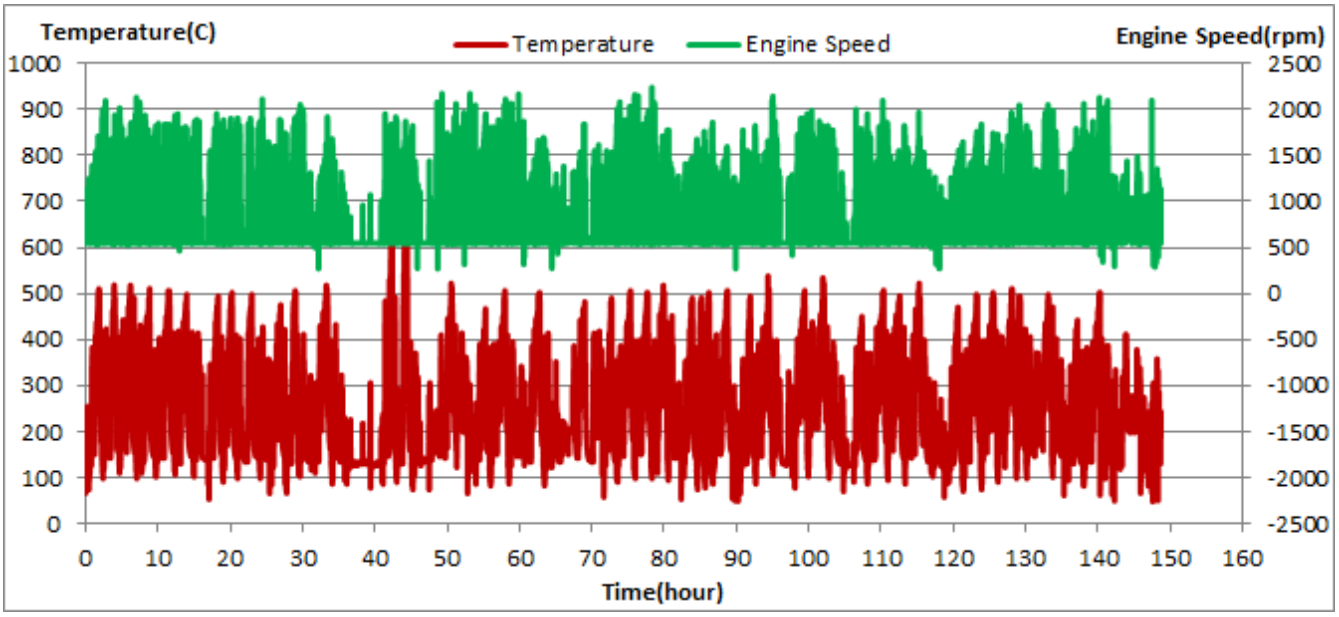


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 200 mbar can't be obtained and only 0.3% of total working-time pressure is above 150 mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 8% of total working-time temperature is above 400 °C and 16% above 350°C. This high temperature distribution is cause of acceptable operation of this filter over the period.
- This vehicle operates in line 4 and for it's path characteristic, engine operates in high speed.

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

All right reserved by ASA company – confidental no passing to third parties.

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 producer company	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	16/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.24 $[m^{-1}]$
K value - DPF downstream	0.06 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	37232 km
Bus mileage over the period	2579 km
Working days over the period	15 days
Stop days	1 day
Data logger working days	12 days
Working hours over the period	159.23+3*13.27=199.04 hours
Average working hours per day (including stop days)	12.44 hours
Bus average speed	12.95 km/hr
idle speed time to all working time ration	33%
Total Bus fuel consumption over the period	1903 lit
fuel consumption per hour	9.56 lit/hr
Average fuel consumption	0.74 lit/km
Total Bus additive consumption over the period	0.80 lit
Average additive consumption	0.310 cc/km
additive consumption to fuel ration	420 cc per 1000 lit (Batch Dosing with Tank Level)

Notice: As depicted in Figure 12, data logger hade problem for three days. So we add average working hours to calculated working hours from the data logger.

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

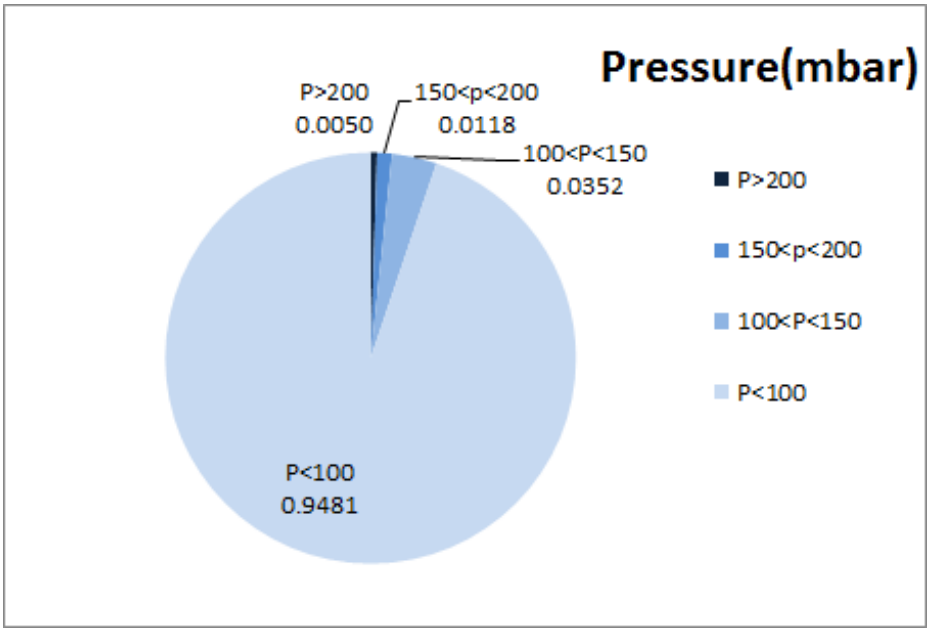


Figure 1- Pressure distribution over the working hours

All right reserved by ASA company – confidential no passing to third parties.

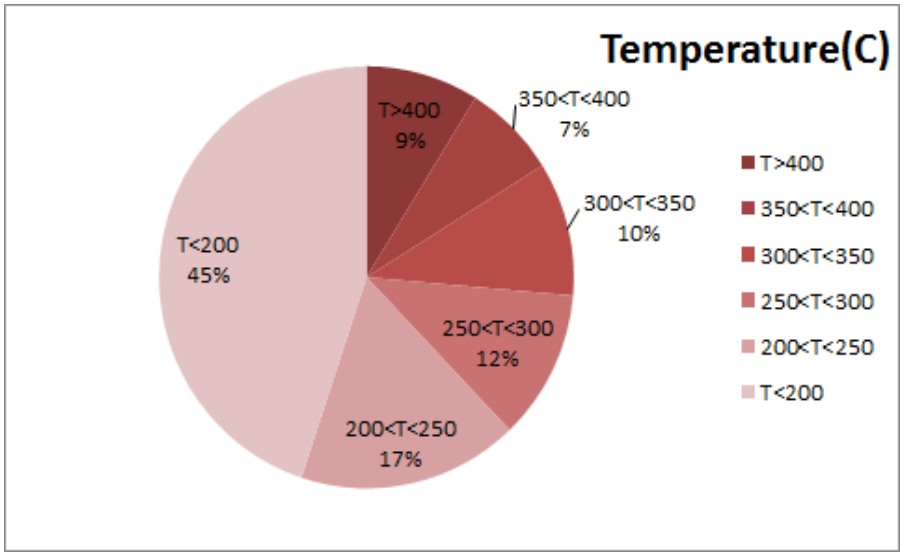


Figure 2-Temperature[1] distribution over the working hours

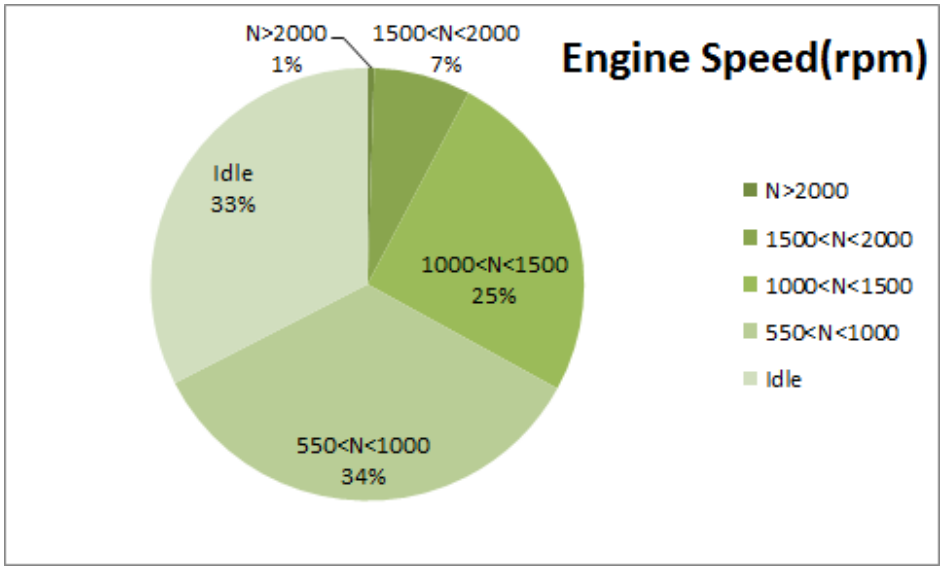


Figure 3- Engine speed distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
256	26.9	882

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
288	36.6	1045

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
578-50	297-0	2432-256

Detailed Pressure Analysis

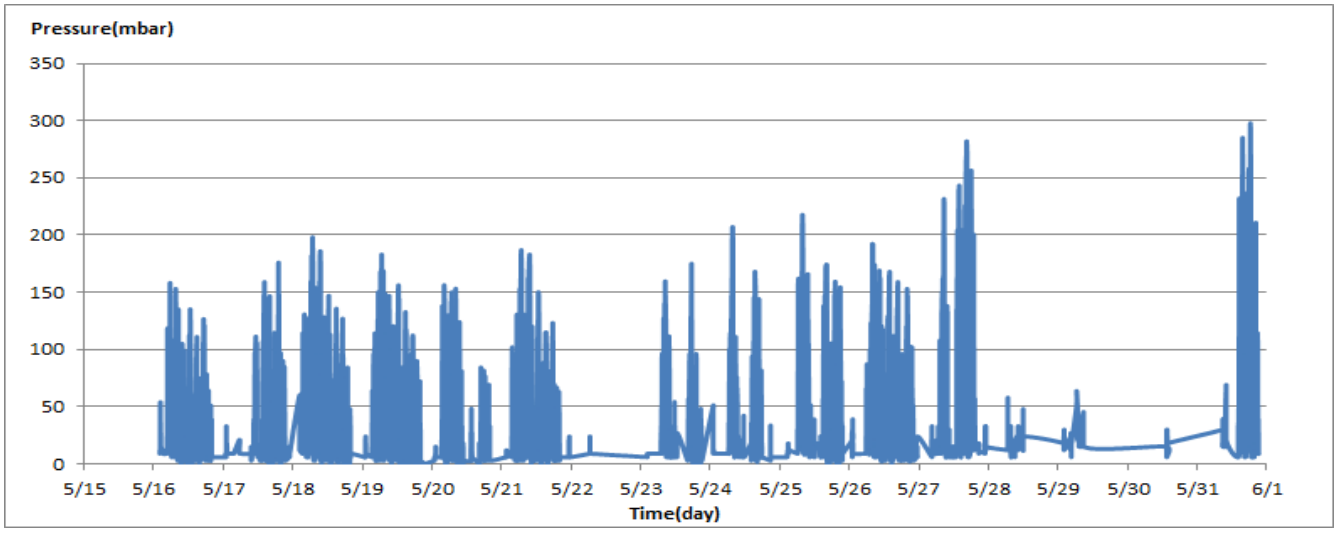


Figure 4- Pressure distribution over sixteen days

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

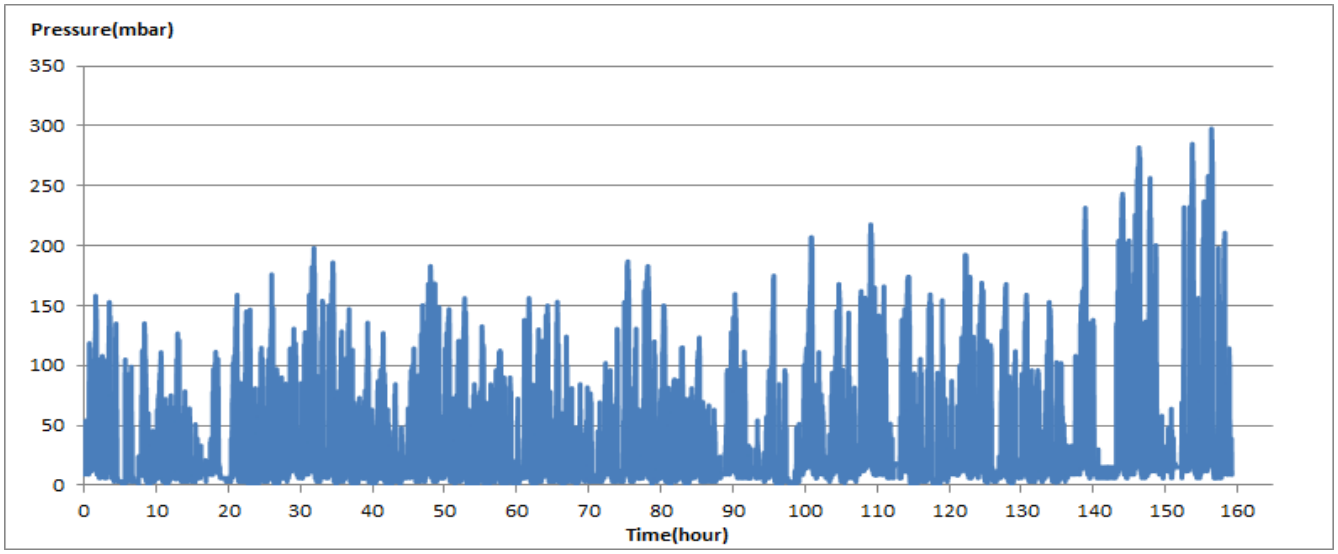


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

All right reserved by ASA company – confidential no passing to third parties.

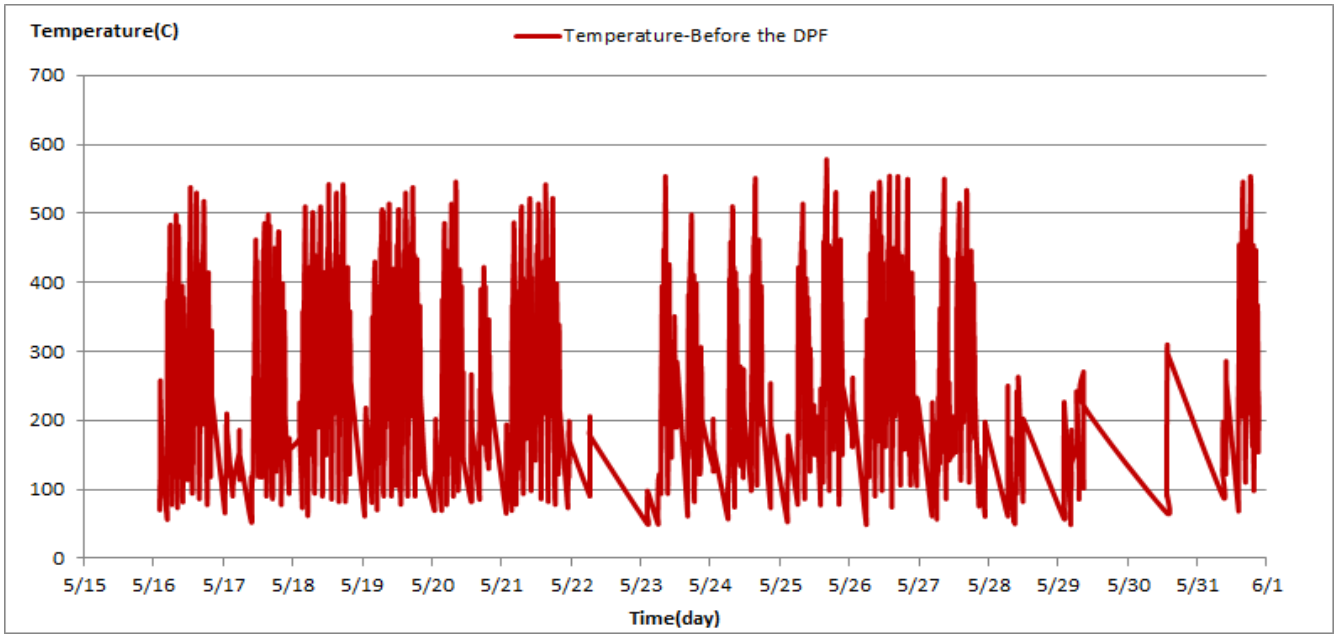


Figure 6- Temperature distribution over sixteen days

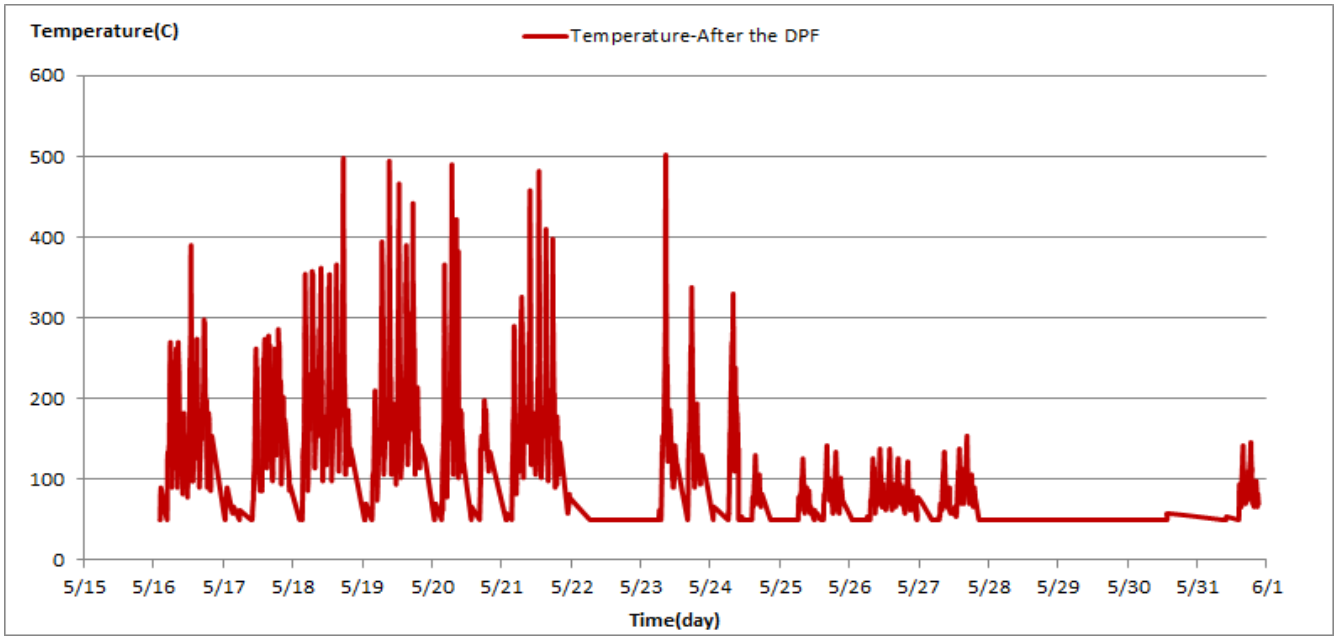


Figure 7- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

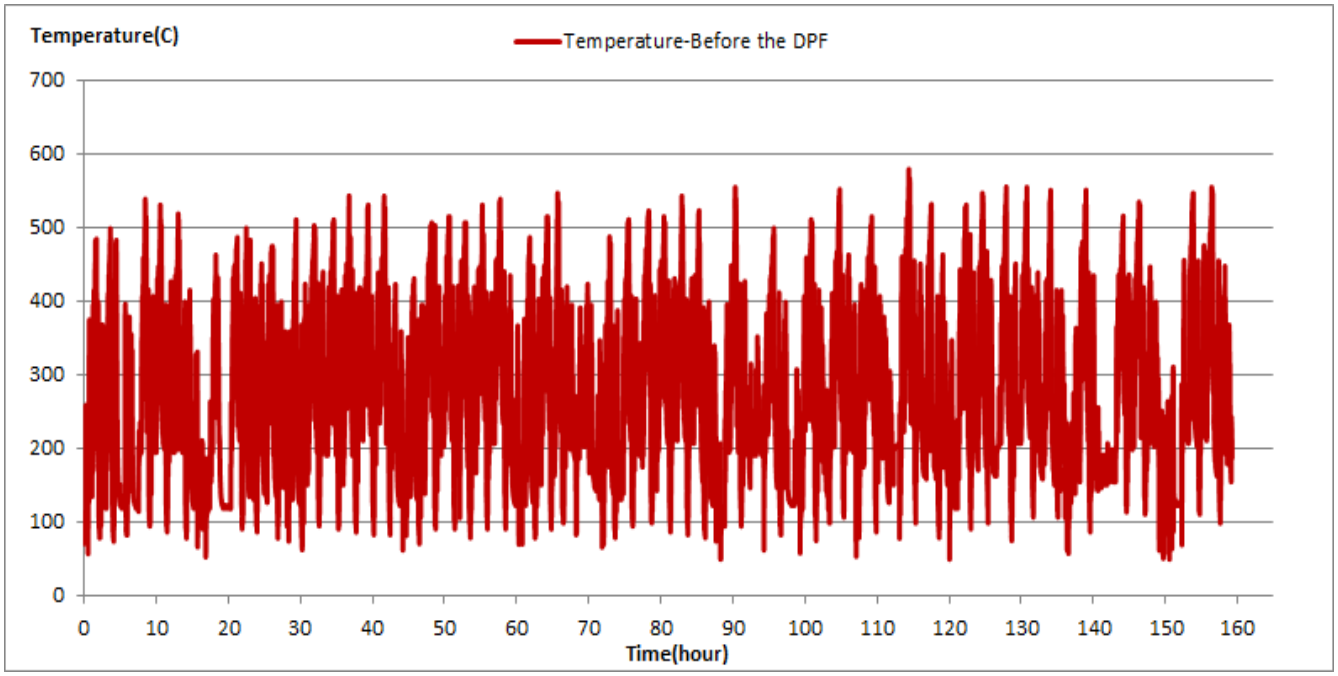


Figure 8- Before DPF temperature vs. working hours

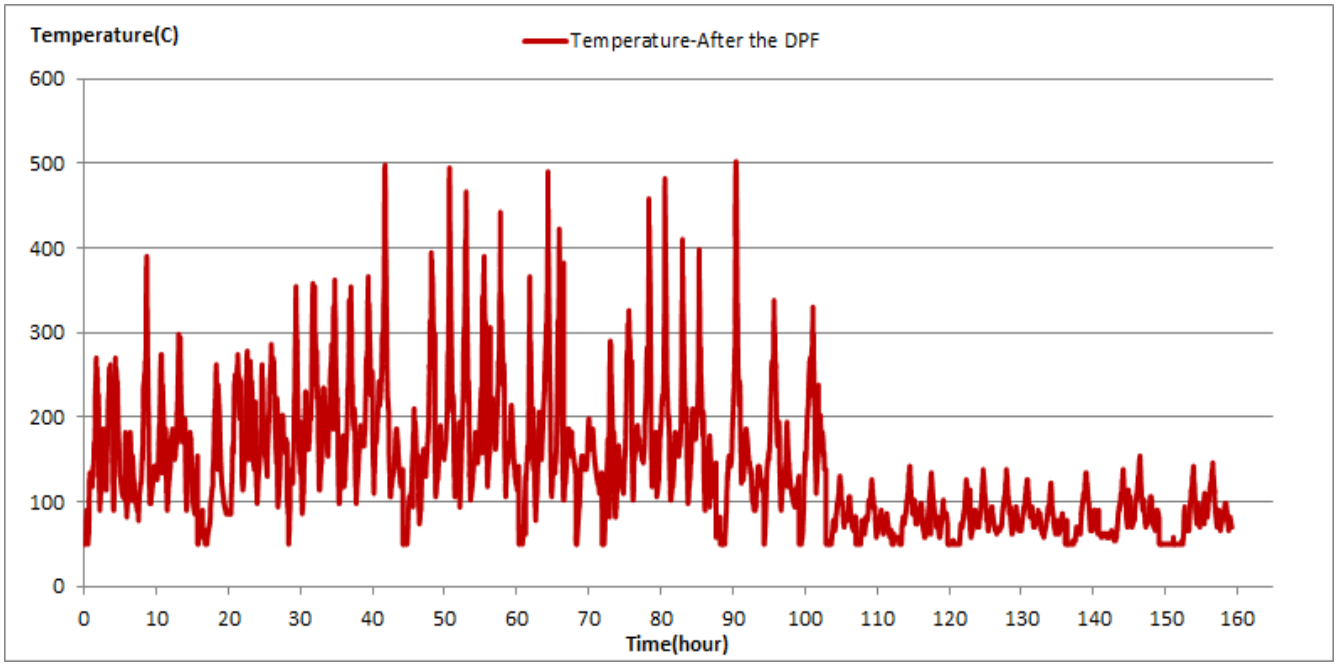


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

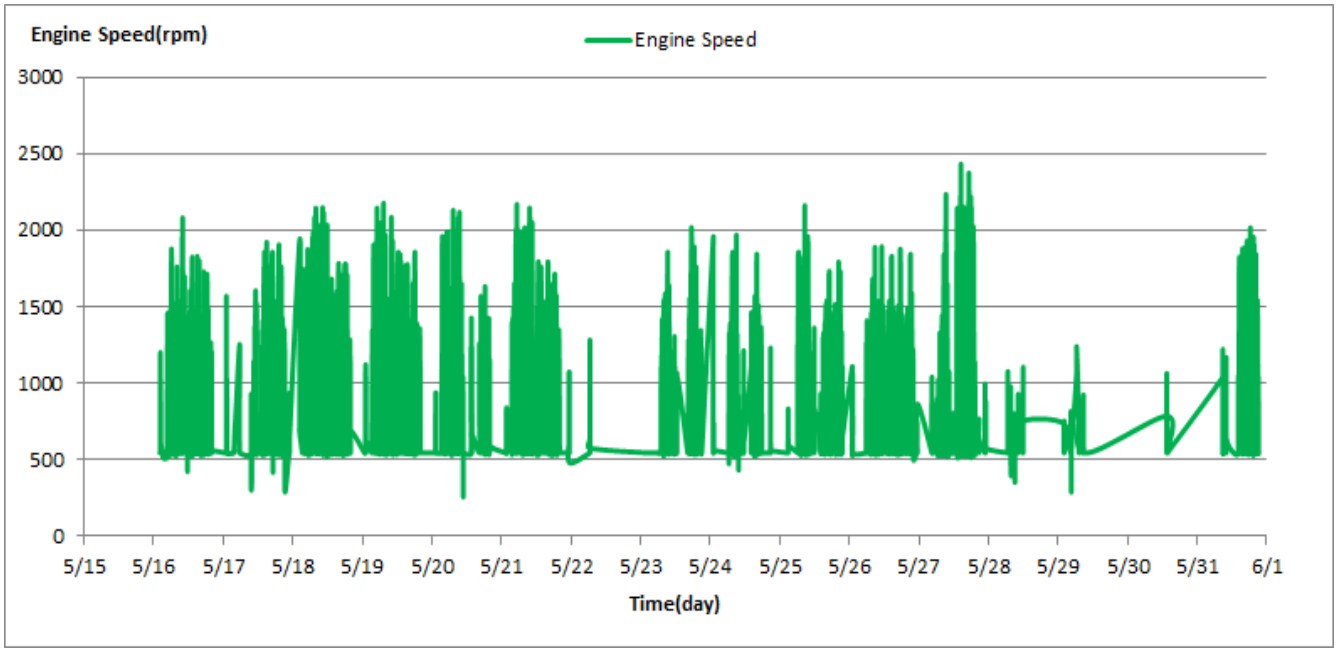


Figure 10- Engine speed distribution over sixteen days

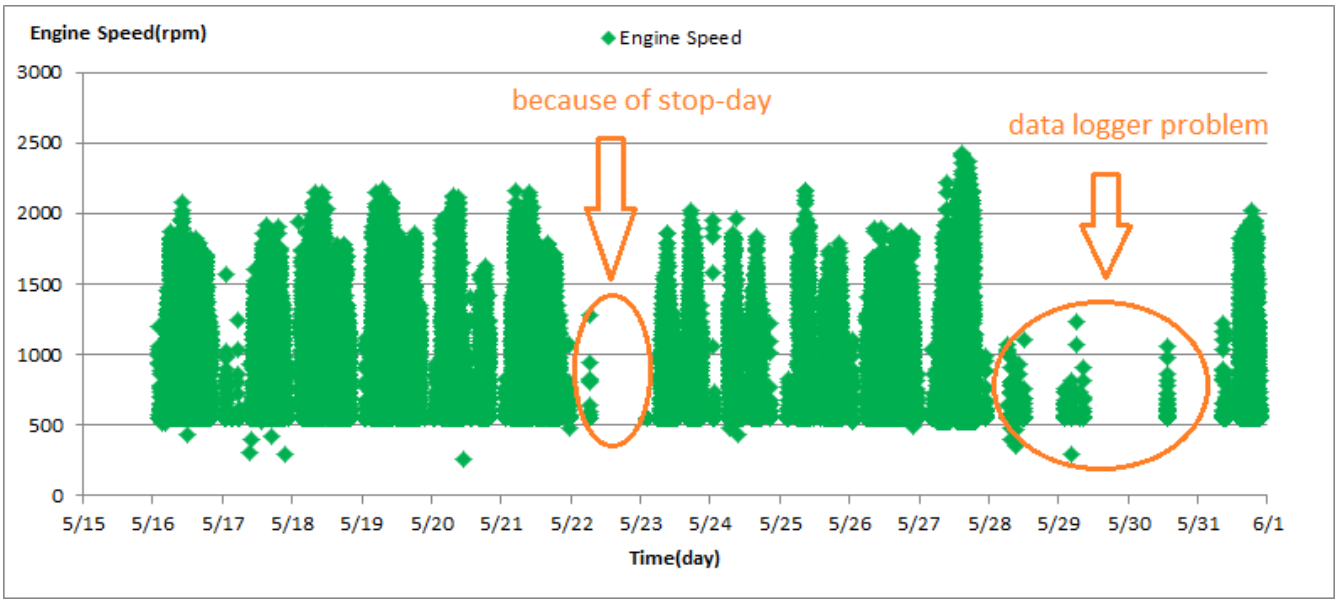


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

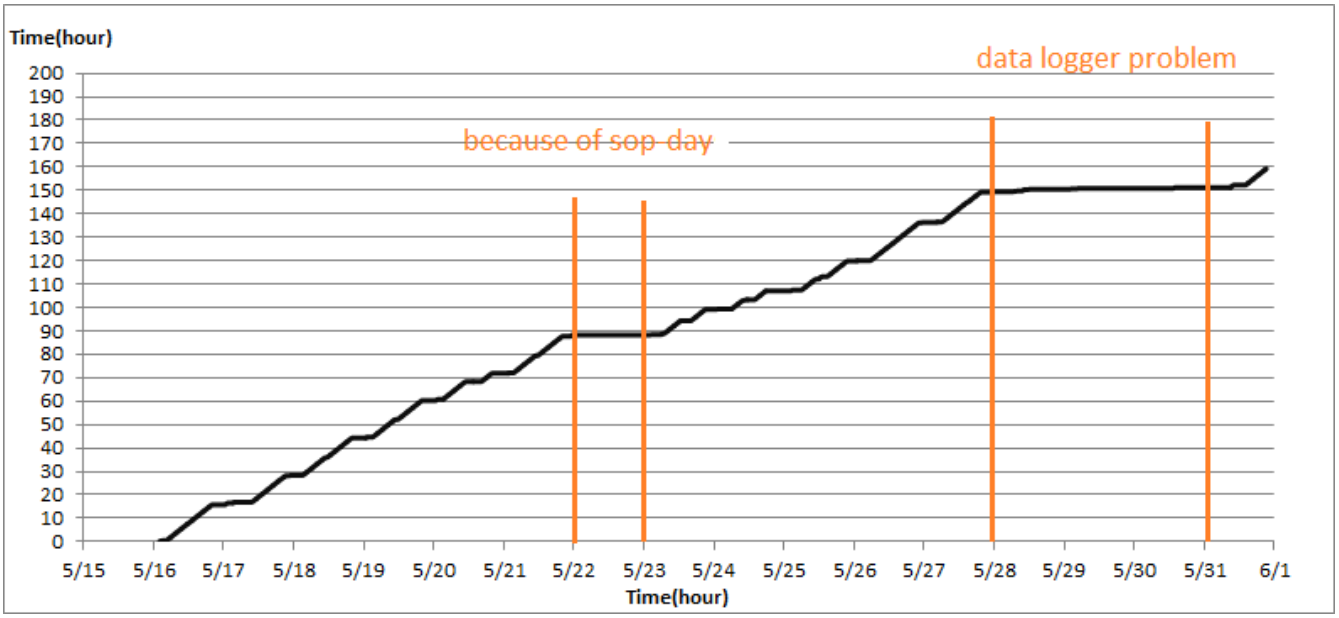


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

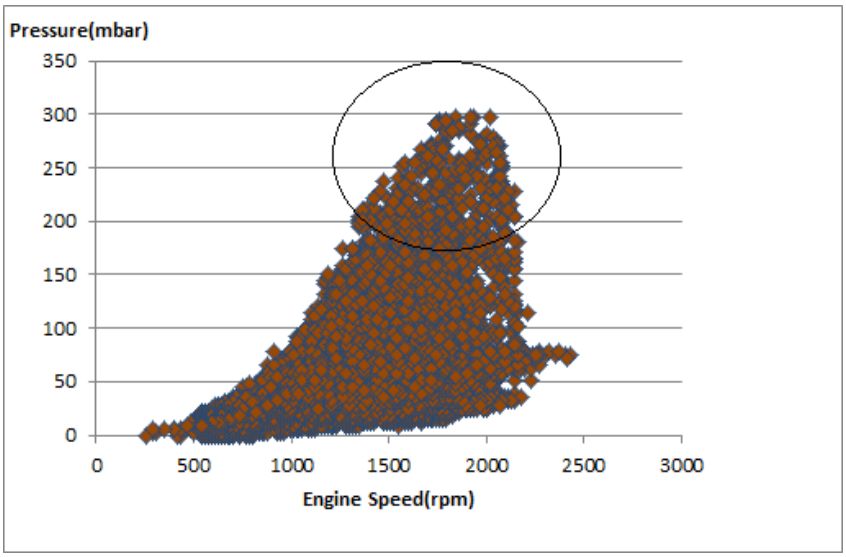


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

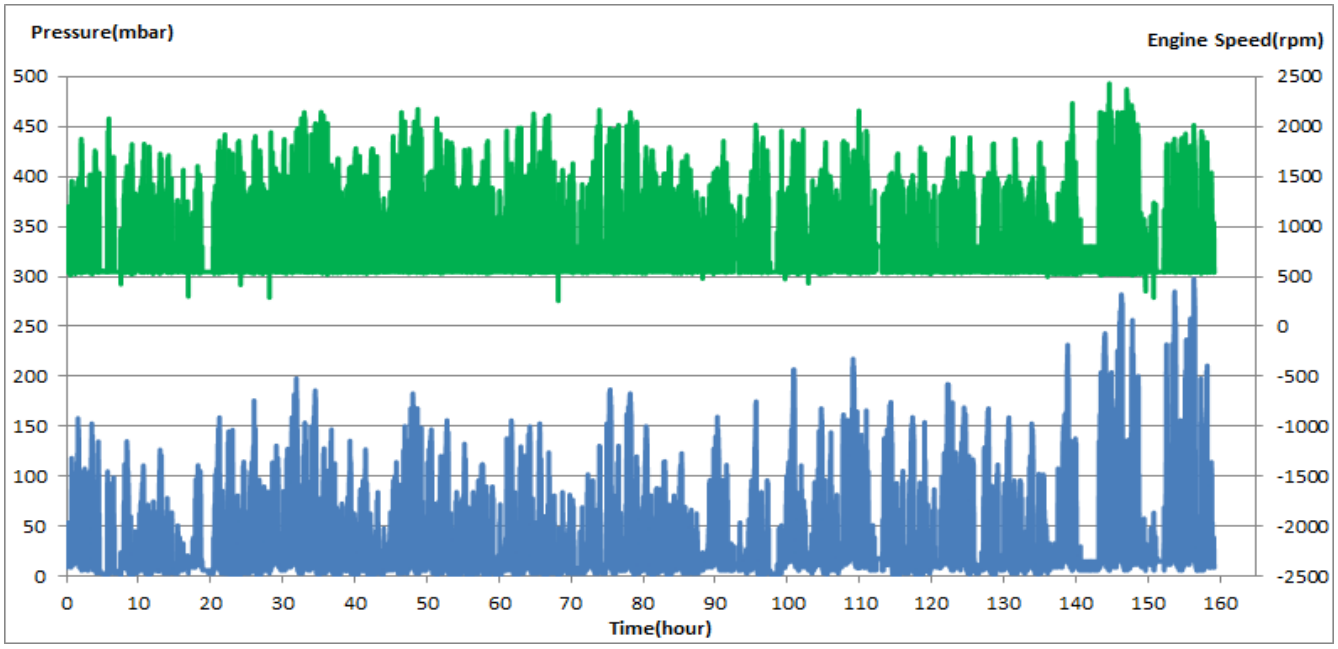


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

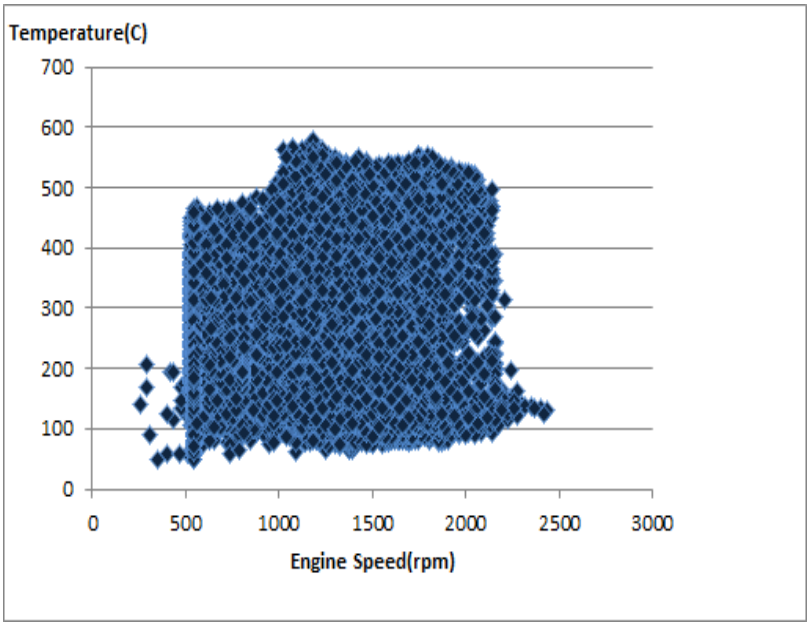


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

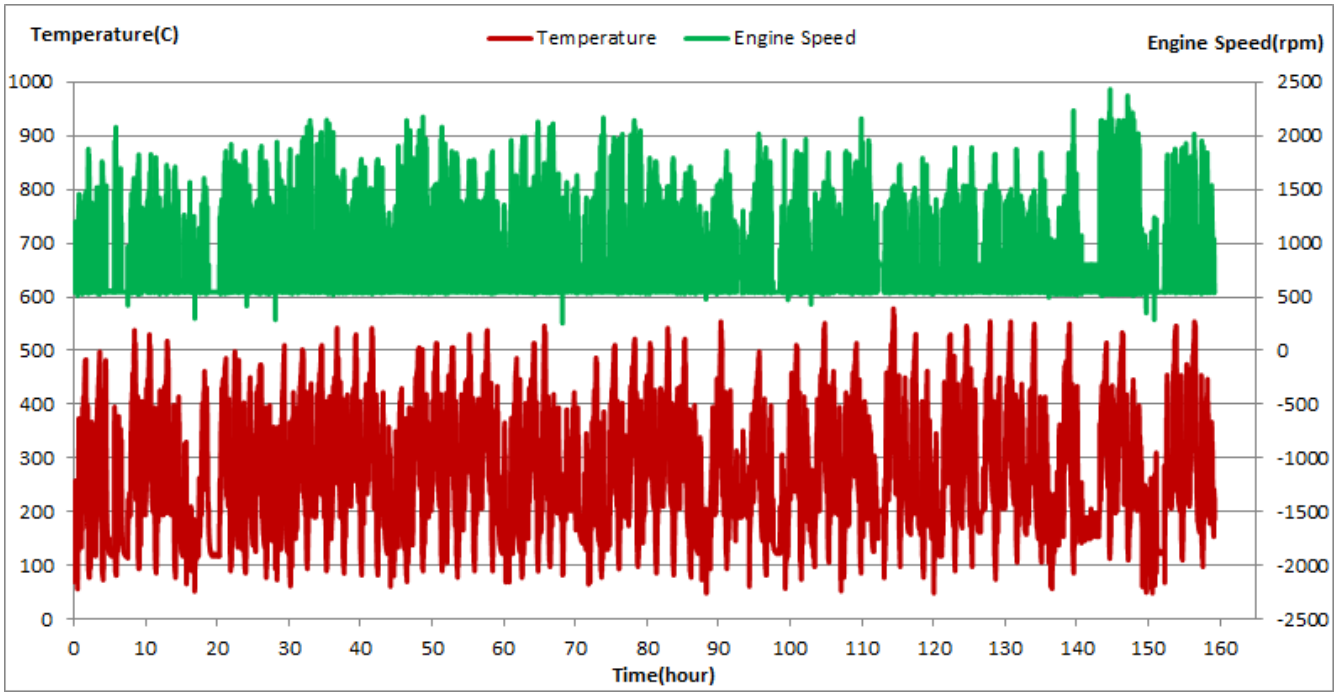


Figure 16- T, N distribution vs. working hours

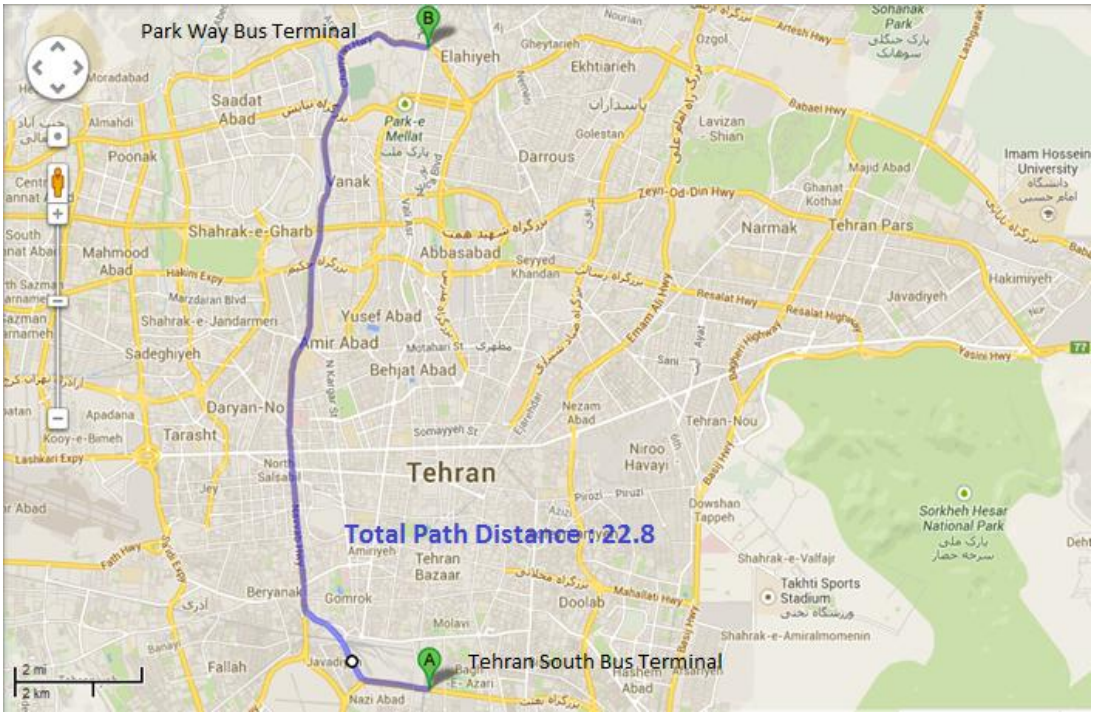
Filter Operation Analysis

- As depicted in Figure 1, 0.5% of total working-time pressure is above 200 mbar and 1.68% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 9% of total working-time temperature is above 400 ℃ and 16% above 350℃. This high temperature distribution is cause of acceptable operation of this filter over the period. .
- This vehicle operates in line 4 and for its path characteristic, engine operates in high engine speed.

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

All right reserved by ASA company – confidential no passing to third parties.

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



All right reserved by ASA company – confidential no passing to third parties.

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	HJS02 (Active system with FBC- Electrical Heater)
Installation date	19/Feb/2015
Report period	1/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.51 $[m^{-1}]$
K value – DPF downstream	0.08 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	14299 km
Bus mileage over the period	3306 km
Working days over the period	14 days
Stop days	1 days
Data logger working days	13 days
Working hours over the period	181.45+(1*12.96)=195.41 hours
Average working hours per a day (including stop days)	13.02 hours
Bus average speed	16.91 km/hr
idle speed time to all working time ration	49%
Total Bus fuel consumption over the period	1761 lit
fuel consumption per hour	9.01 lit/hr
Average fuel consumption	0.53 lit/km
Total Bus additive consumption over the period	0.792 lit
Average additive consumption	0.240 cc/km
additive consumption to fuel ration	450 cc per 1000 lit (Batch Dosing with Tank Level)

Notice: As depicted in Figure 12, data logger didn't work on May 15th. So we add average working hours to calculated working hours from the data logger.

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

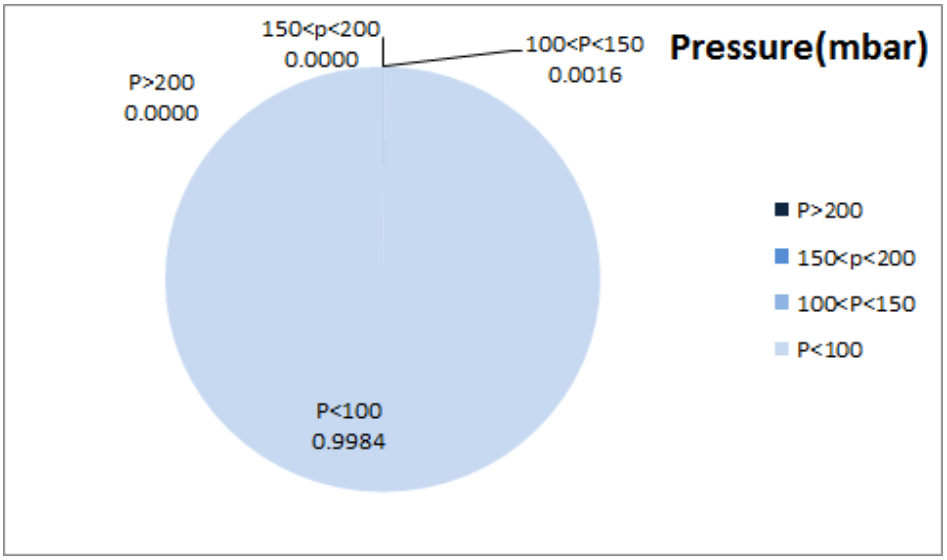


Figure 1- Pressure distribution over the working hours

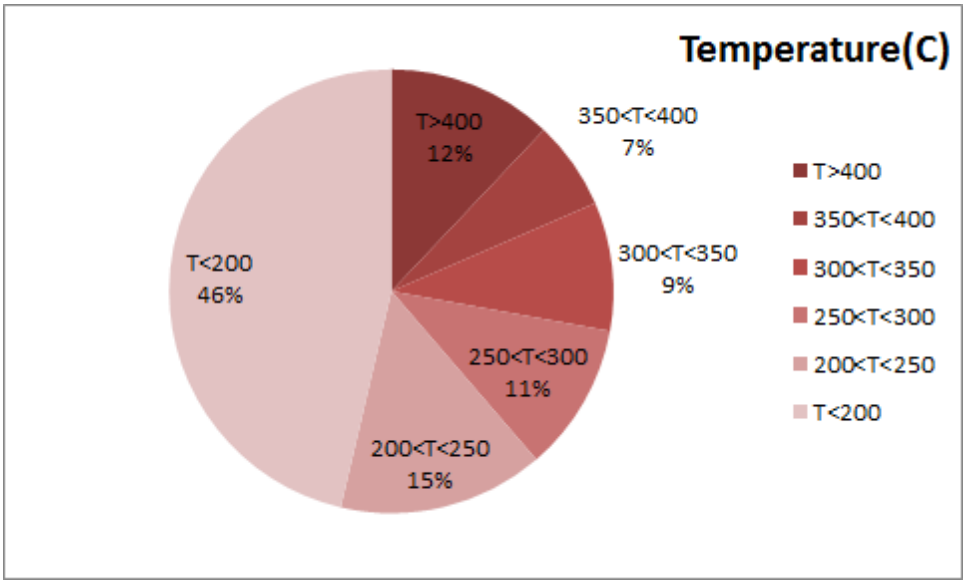


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

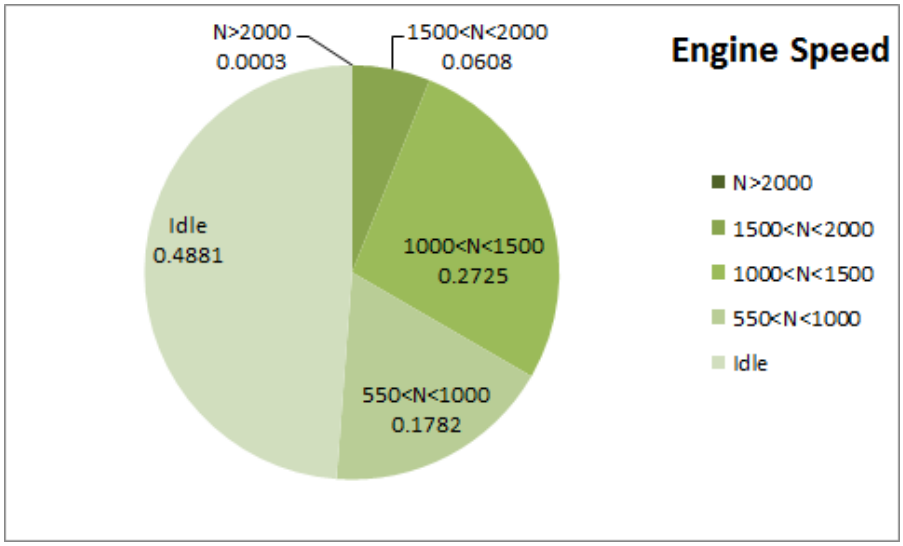


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
241.95	9.65	836

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
306.62	18.33	1115

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
630-50	129-0	2096-256

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

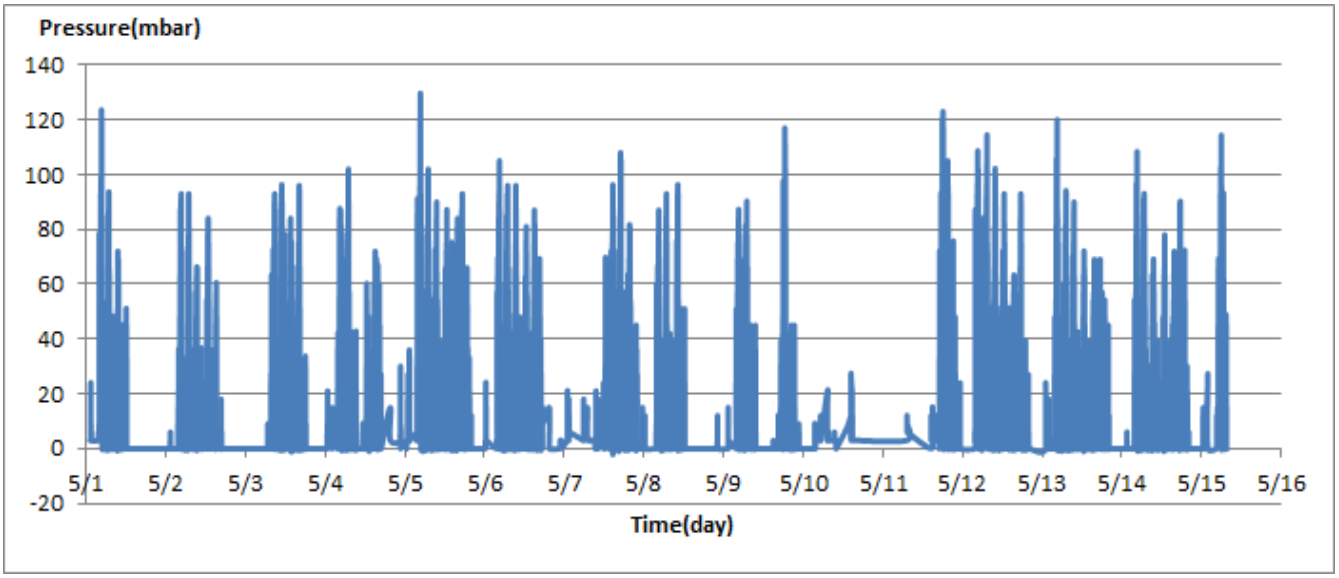


Figure 4- Pressure distribution over fifteen days

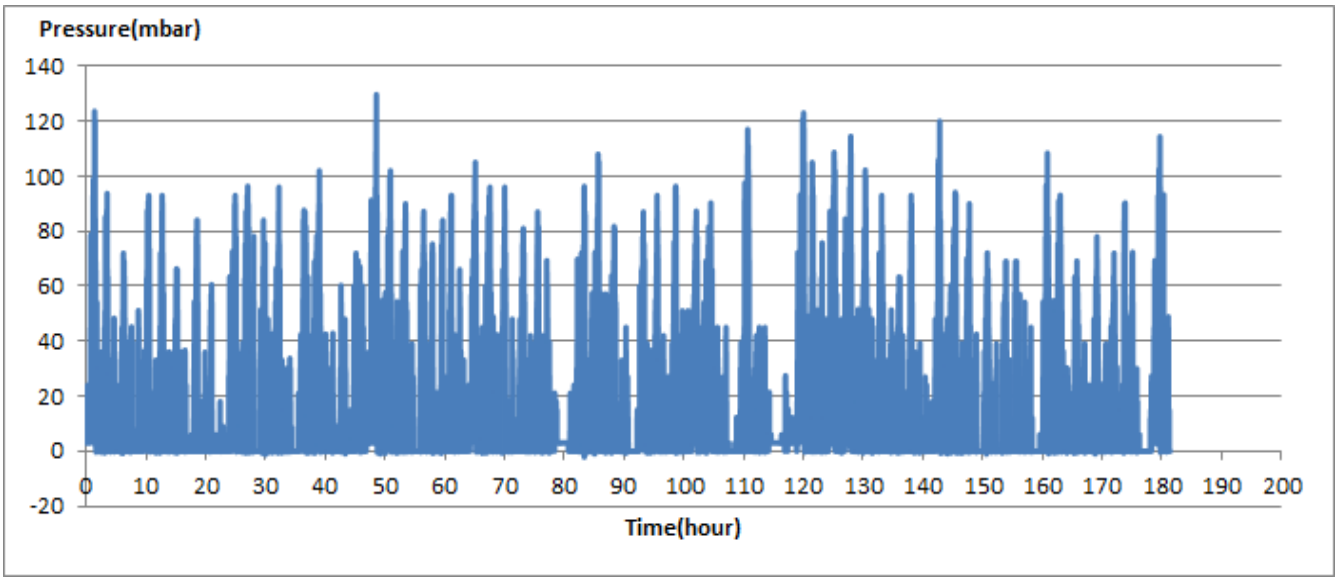


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

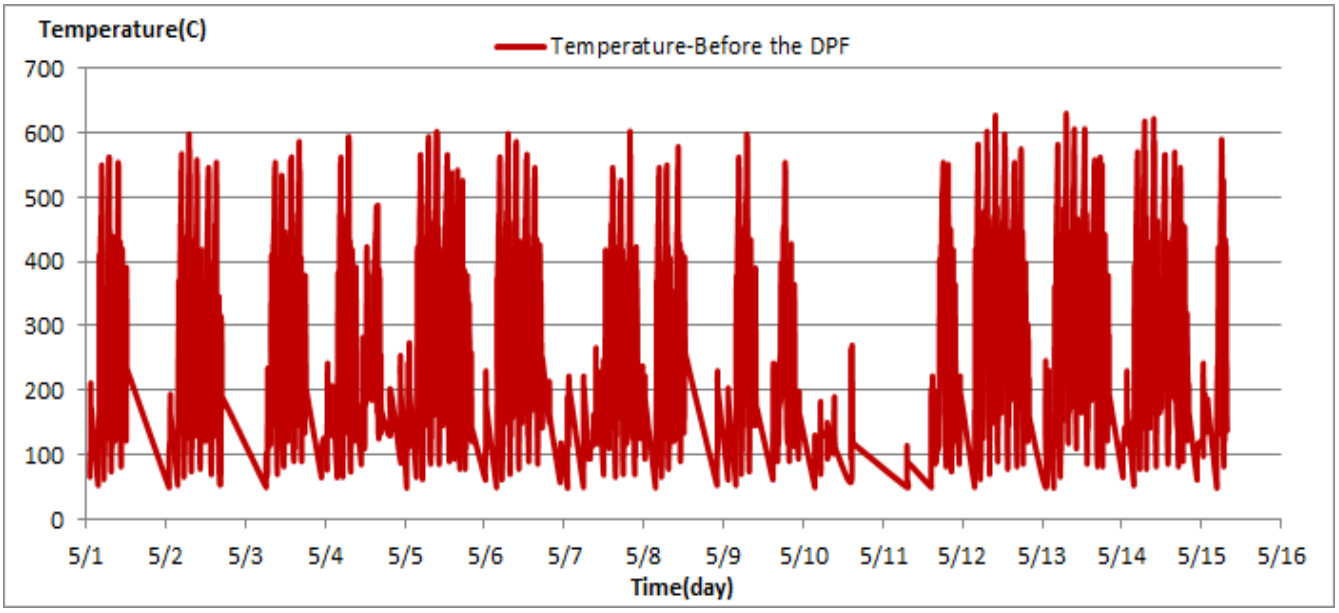


Figure 6- Temperature distribution over fifteen days

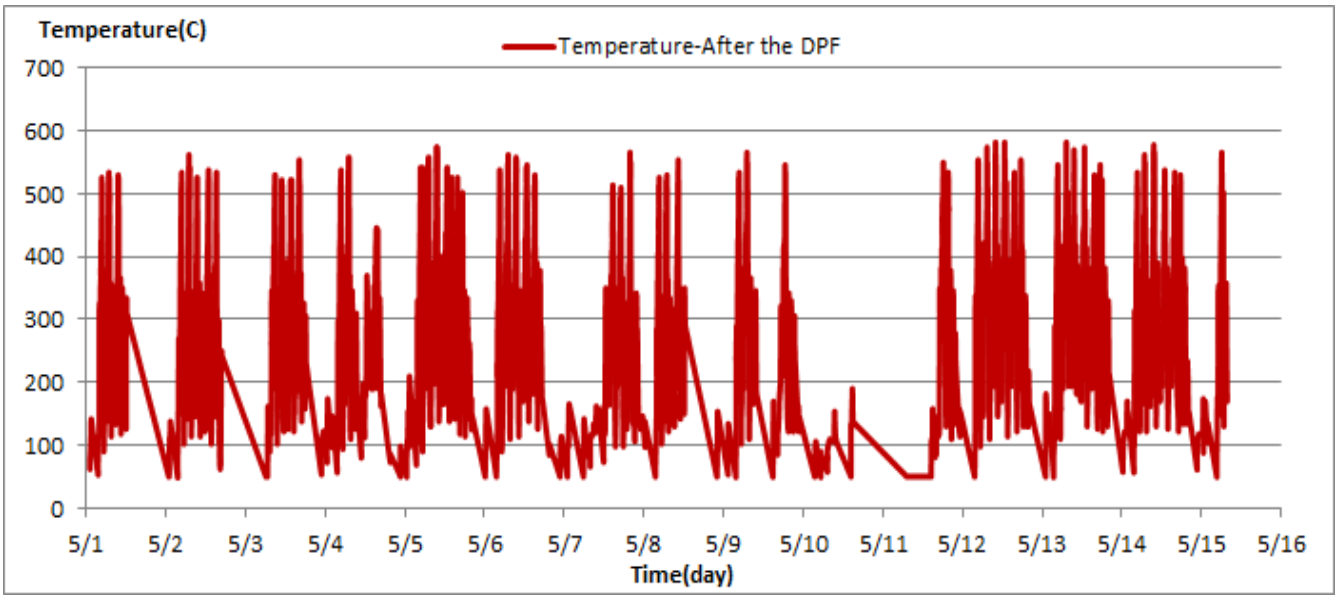


Figure 7- Temperature distribution over fifteen days

All right reserved by ASA company – confidential no passing to third parties.

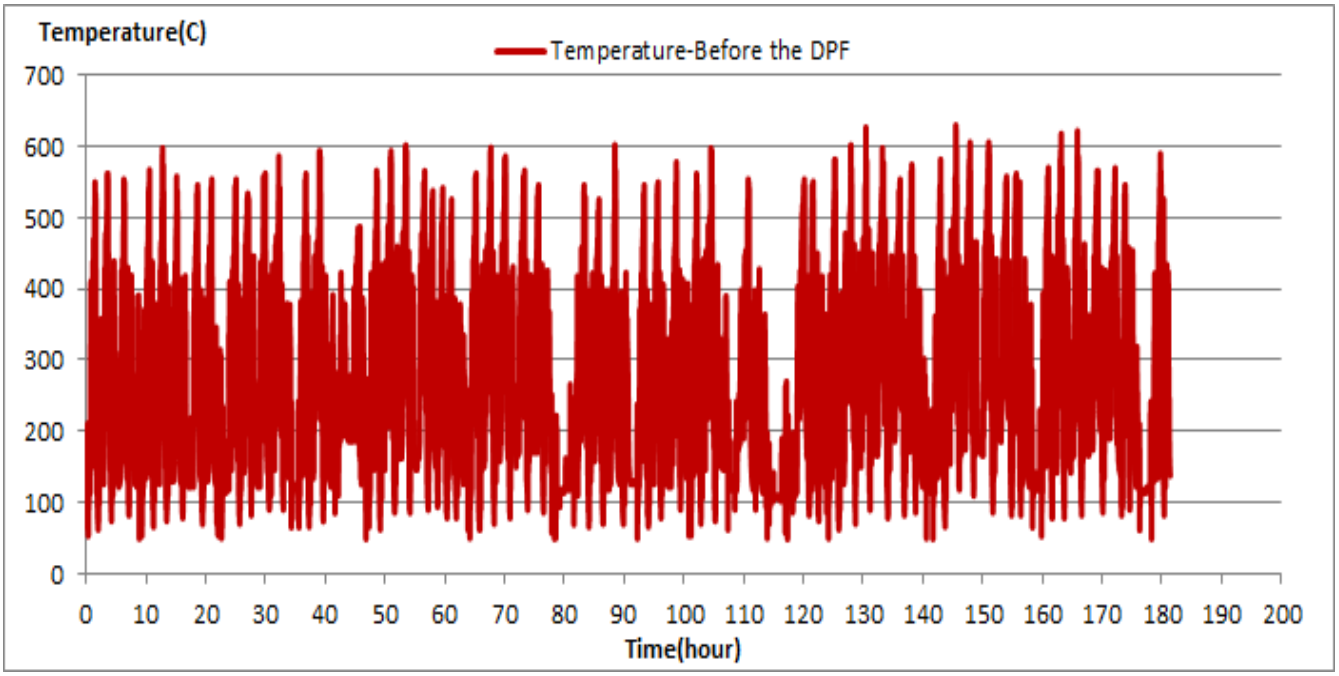


Figure 8- Before DPF temperature vs. working hours

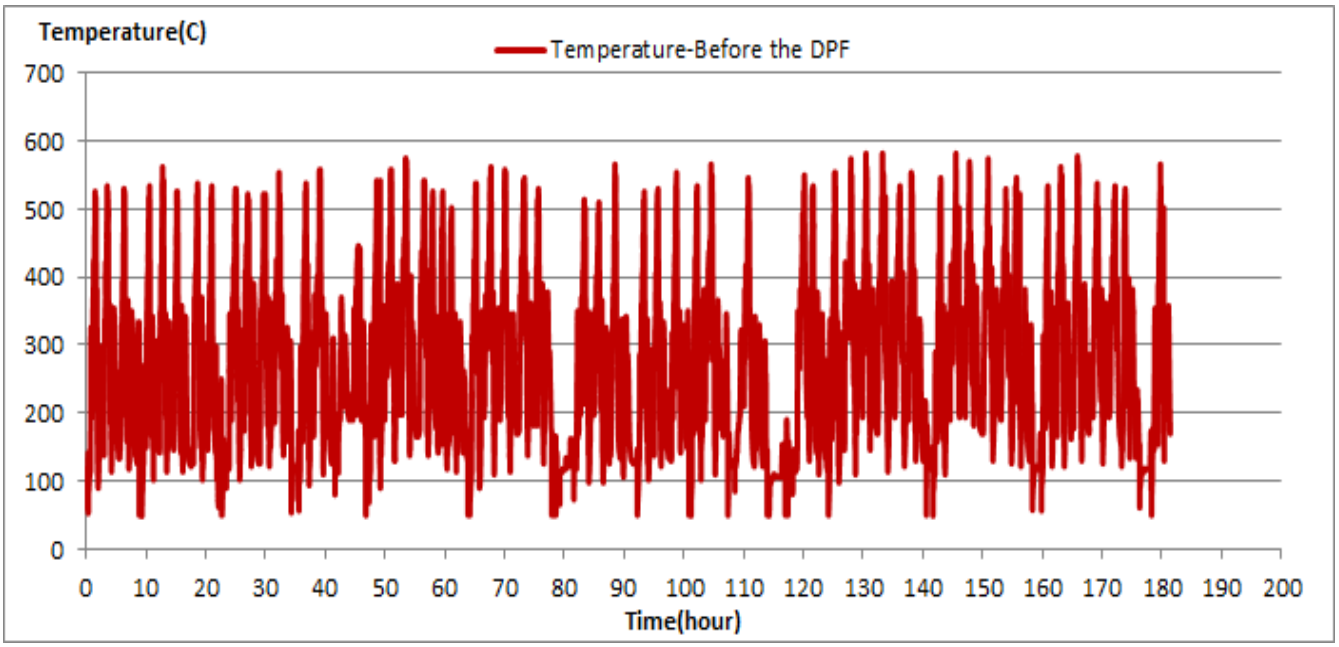


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

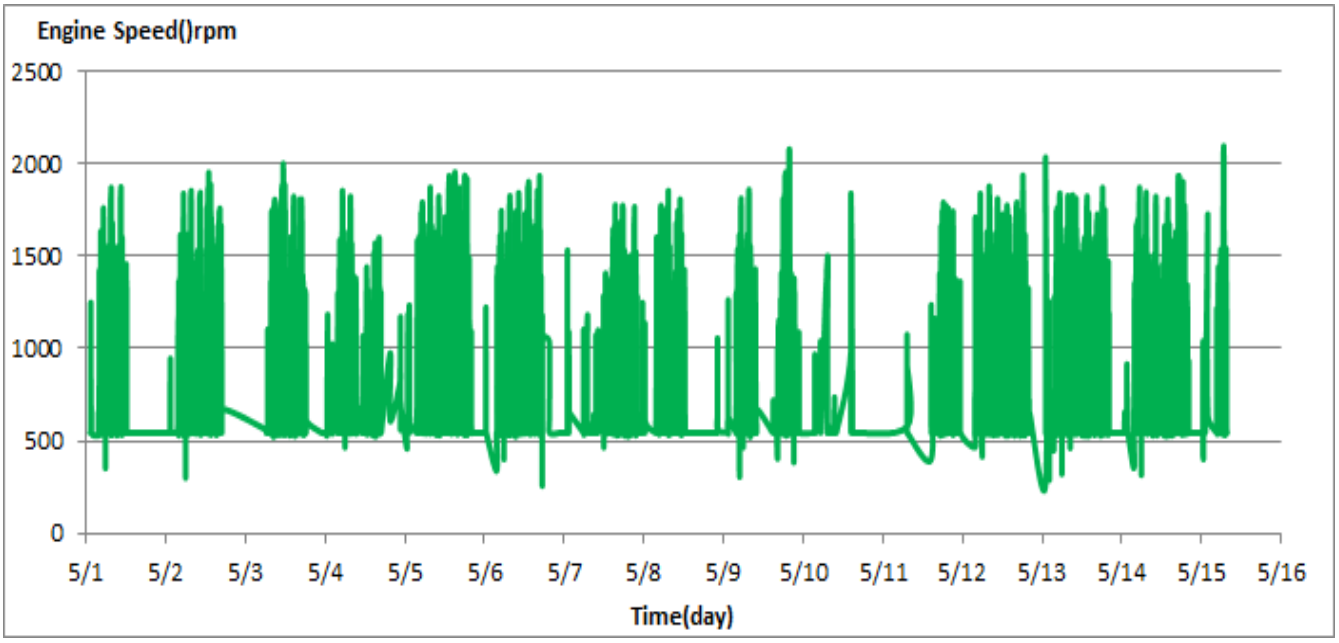


Figure 10- Engine speed distribution over fifteen days

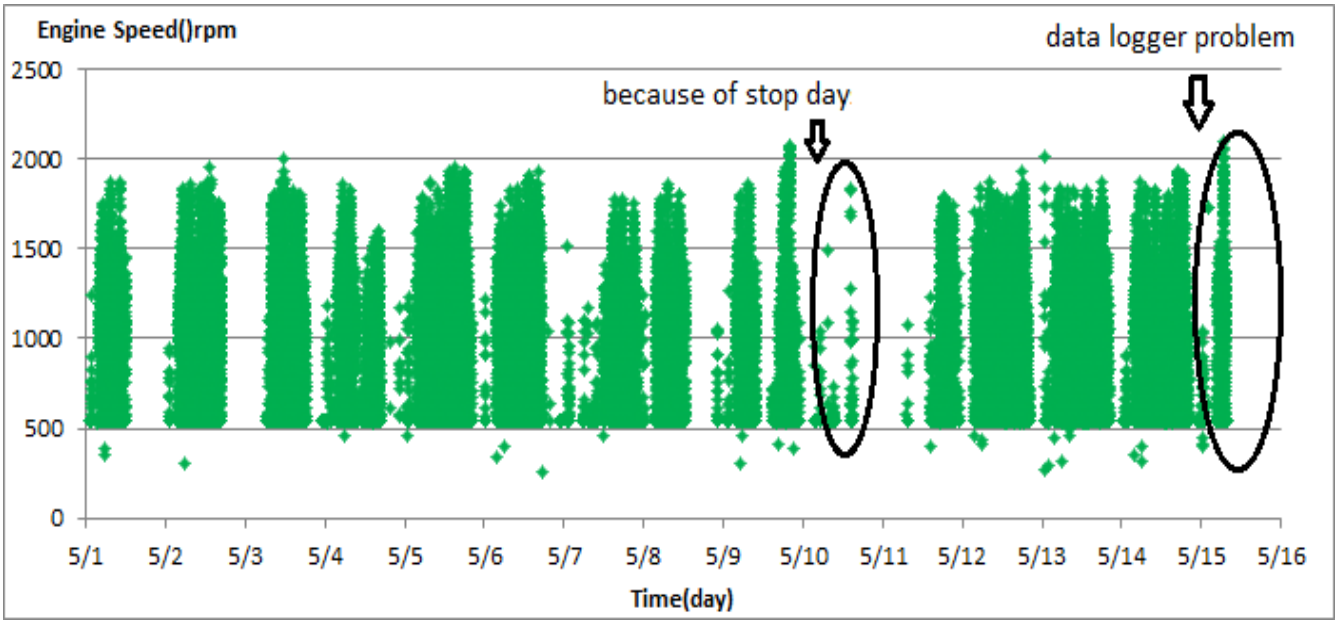


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

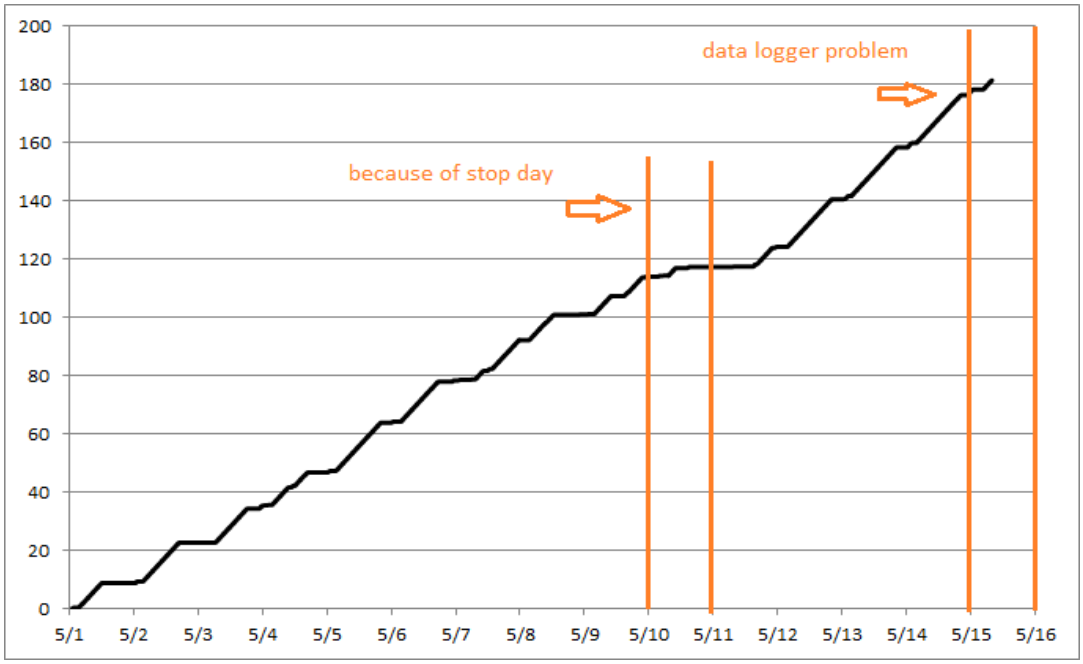


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

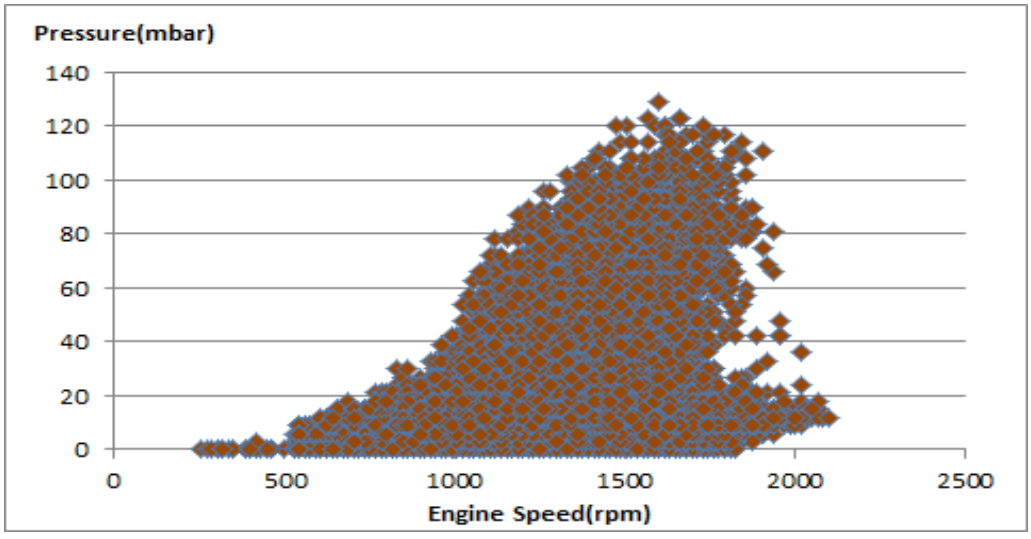


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

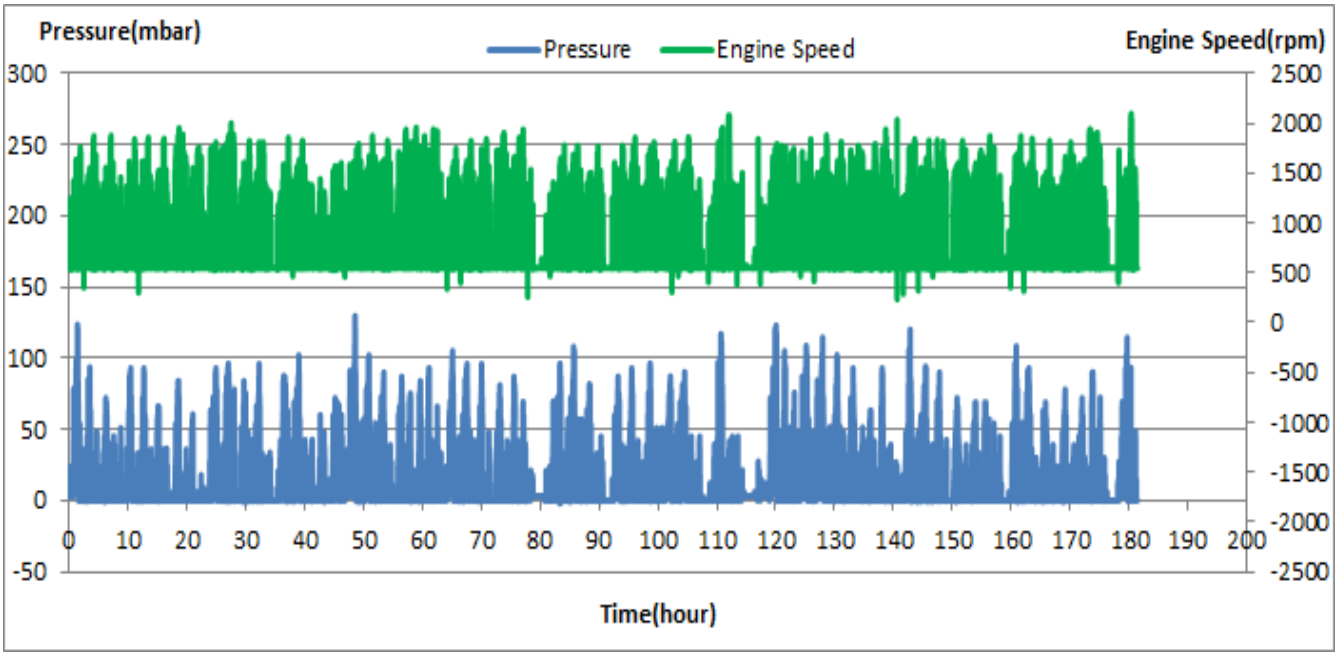


Figure 14- P, N distribution vs. working hours

Notice: Active regeneration can't be observed in this period because of high temperature distribution.

Temperature- Engine Speed Diagram

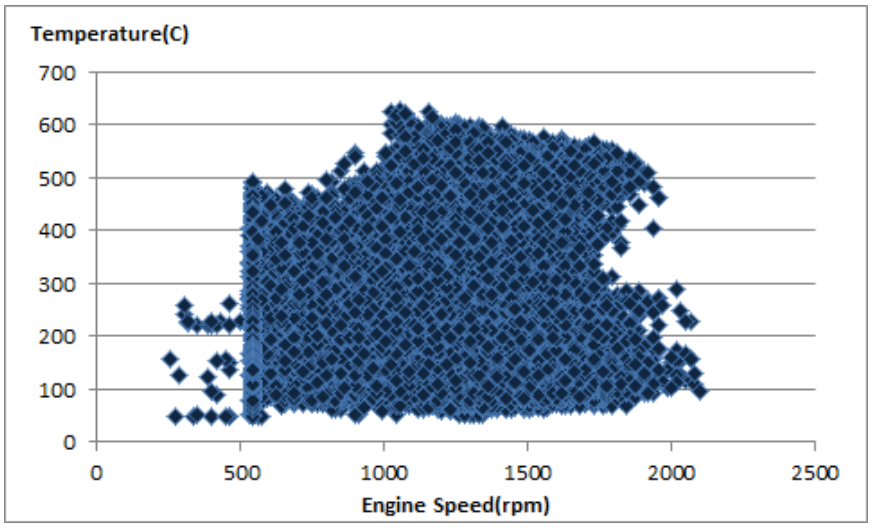


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

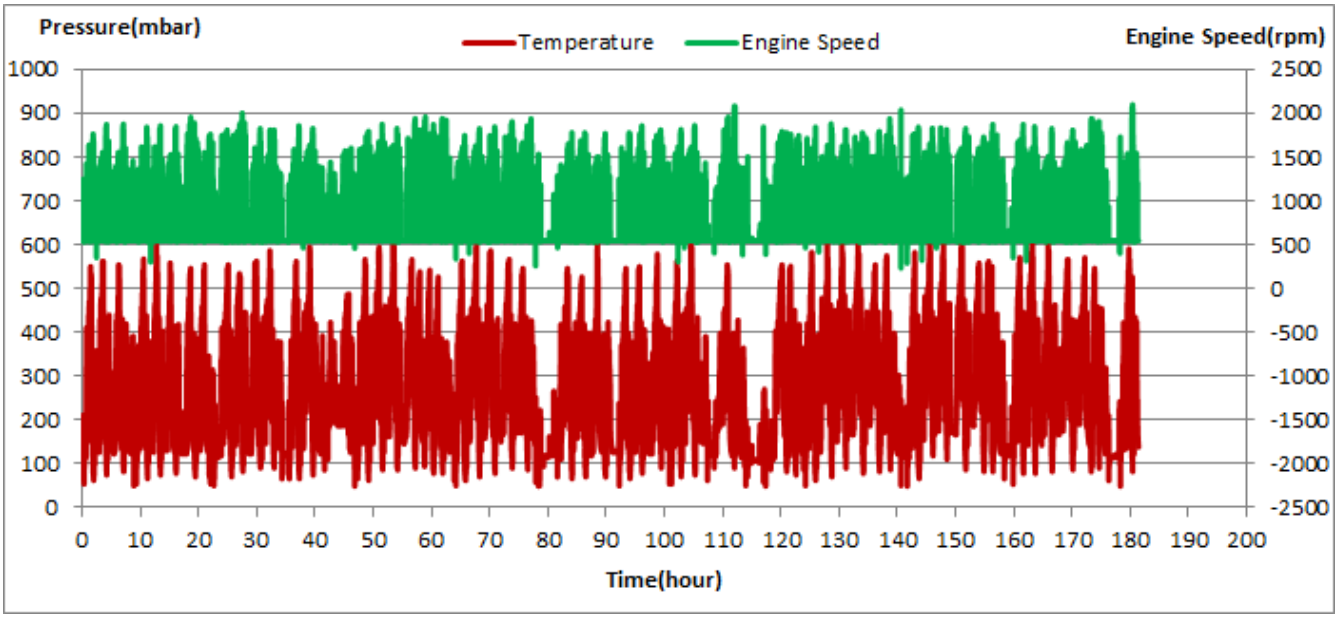


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 150 mbar can't be observed in this period. So it can be concluded that operation of this filter is fully acceptable in this condition.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 12% of total working-time temperature is above 400 °C and 19% above 350°C.
- This vehicle operates in line 4 and for its path characteristic, engine operates in high speed.

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

All right reserved by ASA company – confidential no passing to third parties.

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/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.51 $[m^{-1}]$
K value – DPF downstream	0.08 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	14606 km
Bus mileage over the period	2490 km
Working days over the period	13 days
Stop days	3 days
Data logger working days	13
Working hours over the period	178.91hours
Average working hours per a day (including stop days)	11.18 hours
Bus average speed	13.91 km/hr
idle speed time to all working time ration	49%
Total Bus fuel consumption over the period	1666 lit
fuel consumption per hour	9.31 lit/hr
Average fuel consumption	0.67 lit/km
Total Bus additive consumption over the period	0.73 lit
Average additive consumption	0.293 cc/km
additive consumption to fuel ration	438.2 cc per 1000 lit (Batch Dosing with Tank Level)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

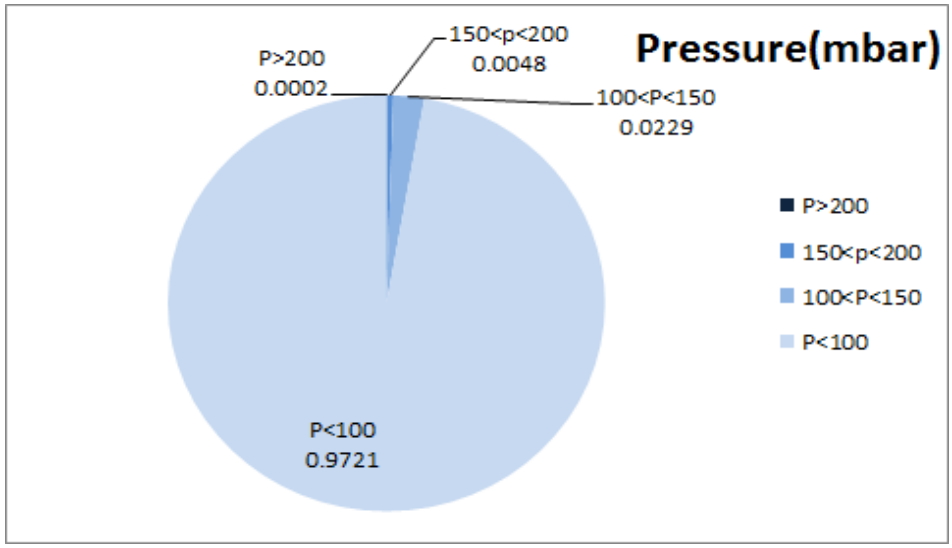


Figure 1- Pressure distribution over the working hours

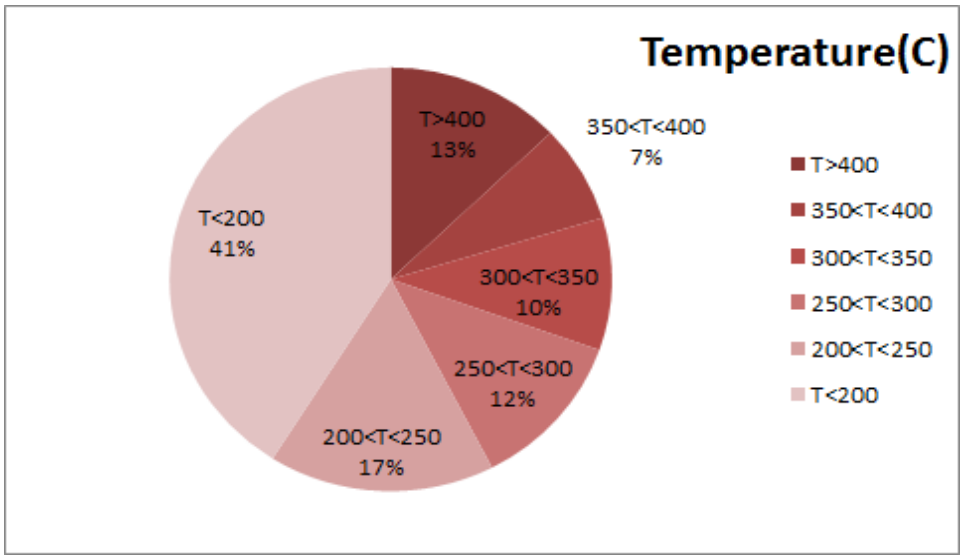


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

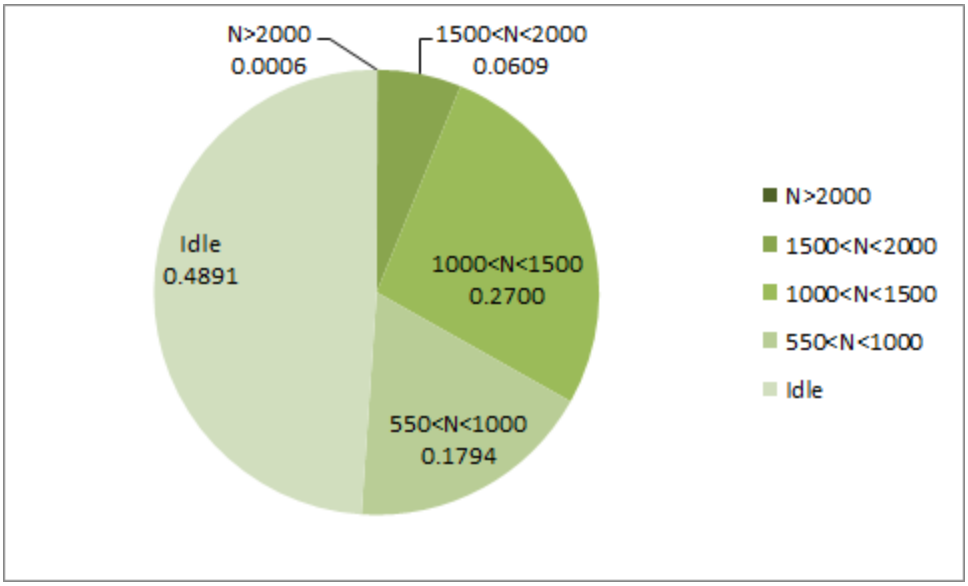


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
254.54	16.98	836

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
315.91	31.38	1140

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
642-50	222-0	2160-272

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

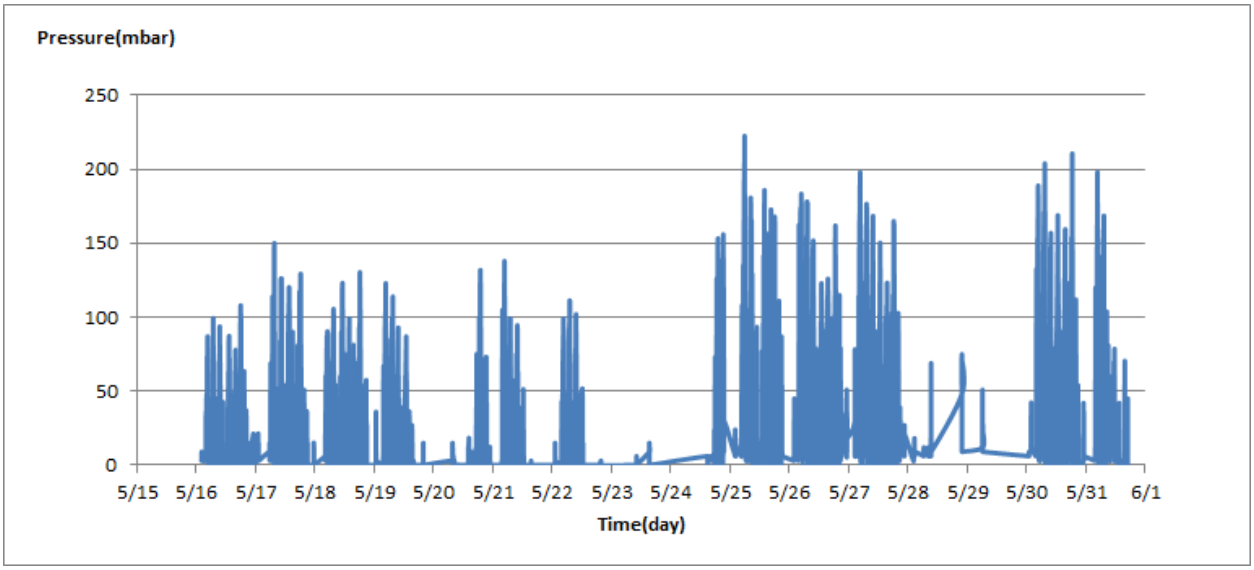


Figure 4- Pressure distribution over sixteen days

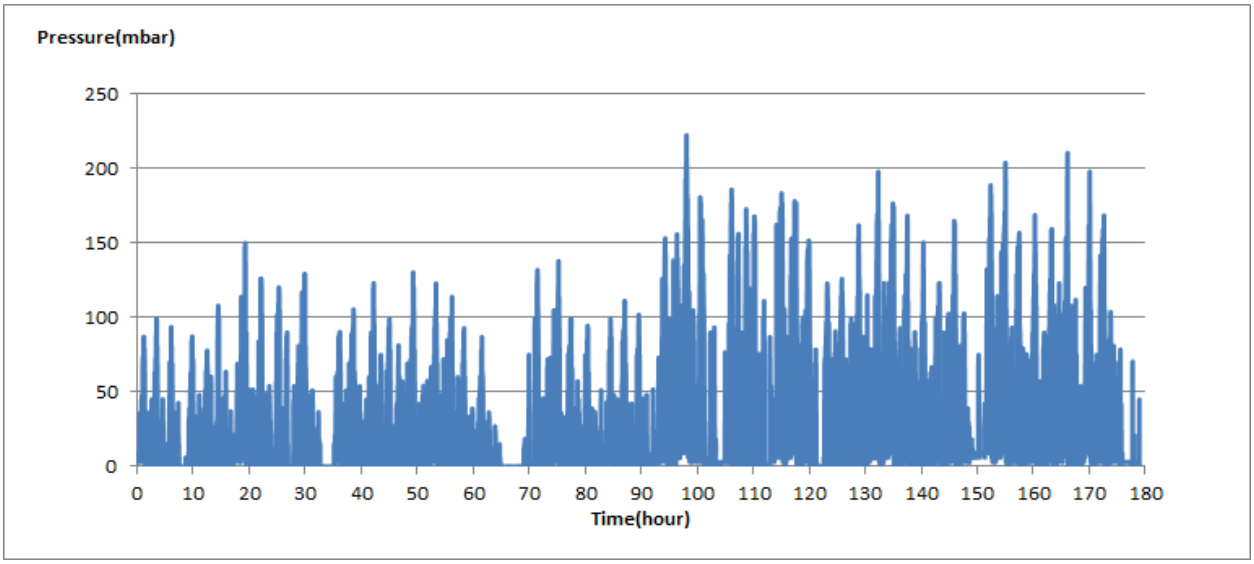


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

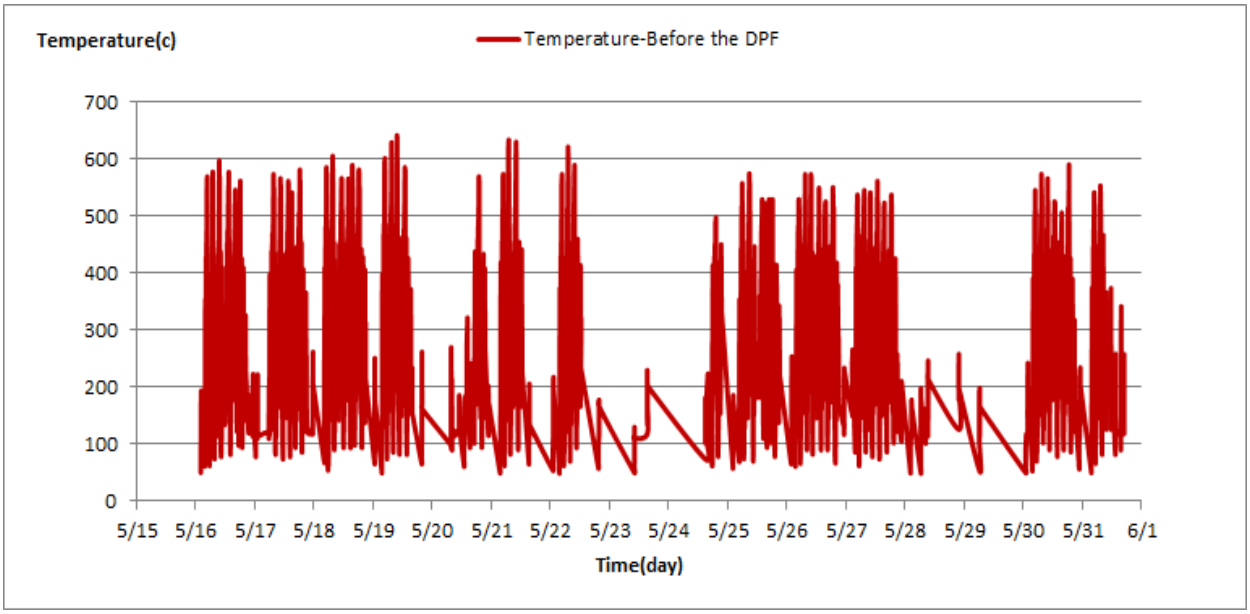


Figure 6- Temperature distribution over sixteen days

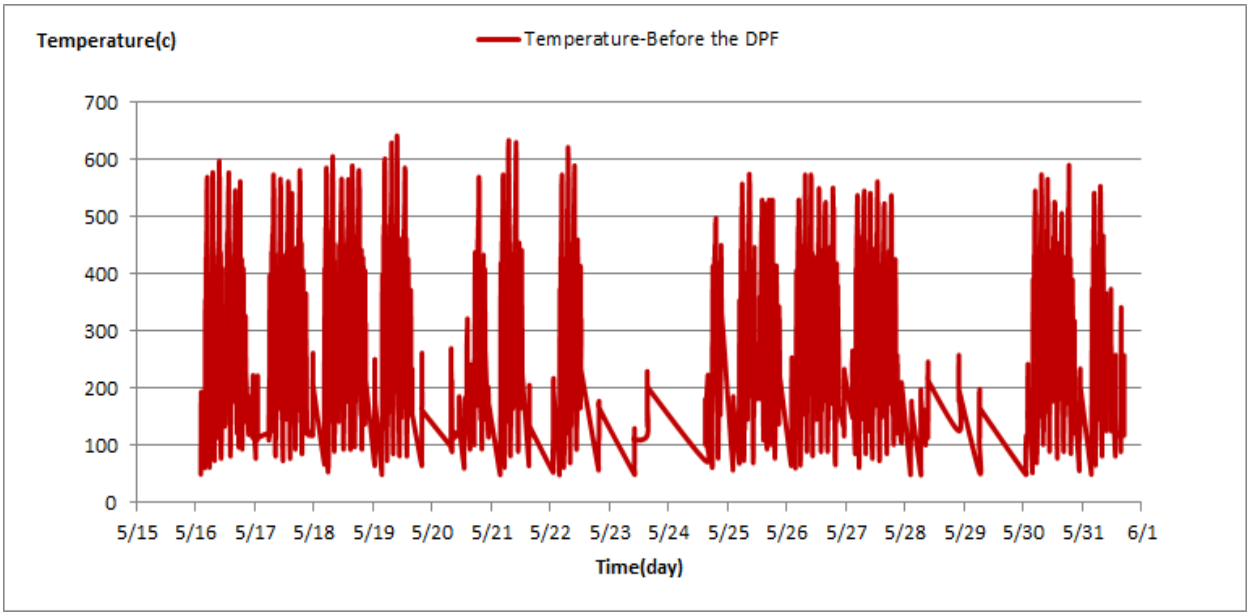


Figure 7- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

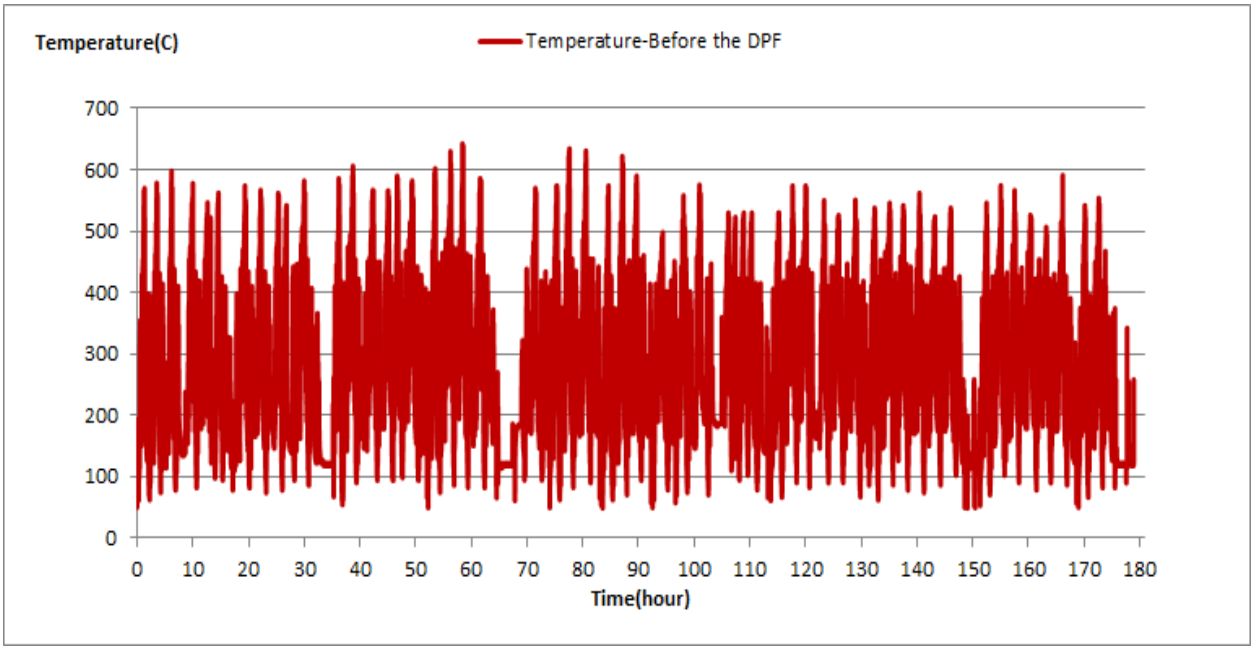


Figure 8- Before DPF temperature vs. working hours

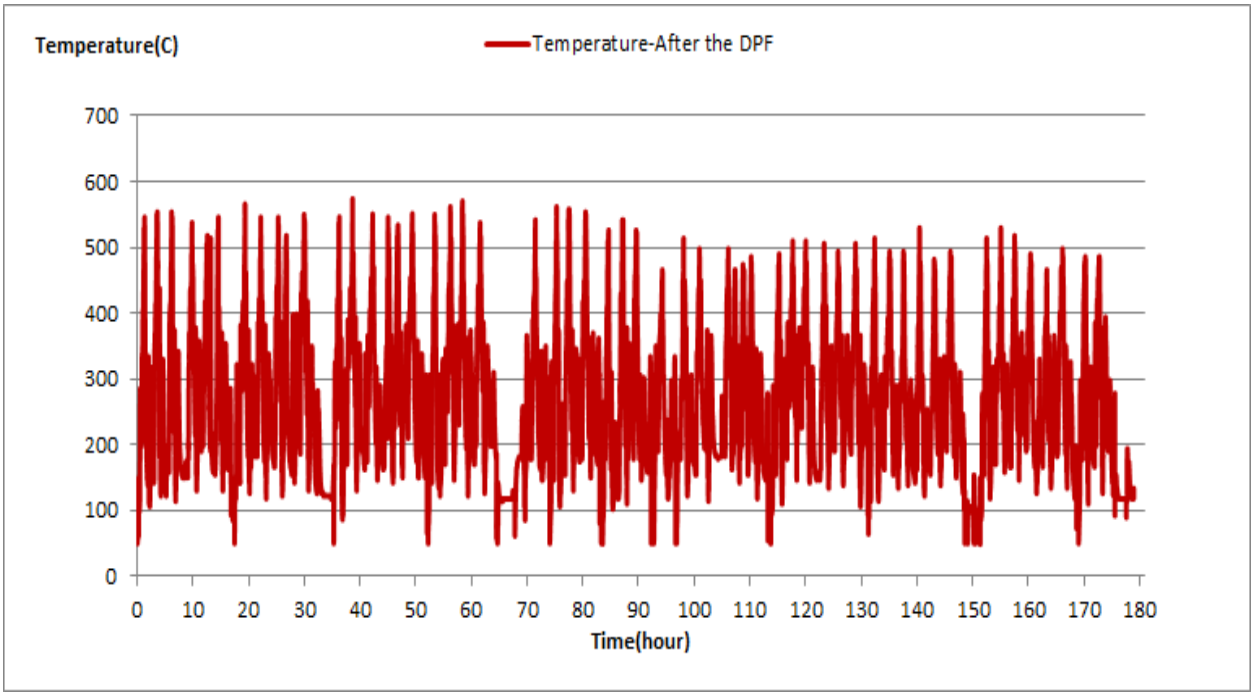


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

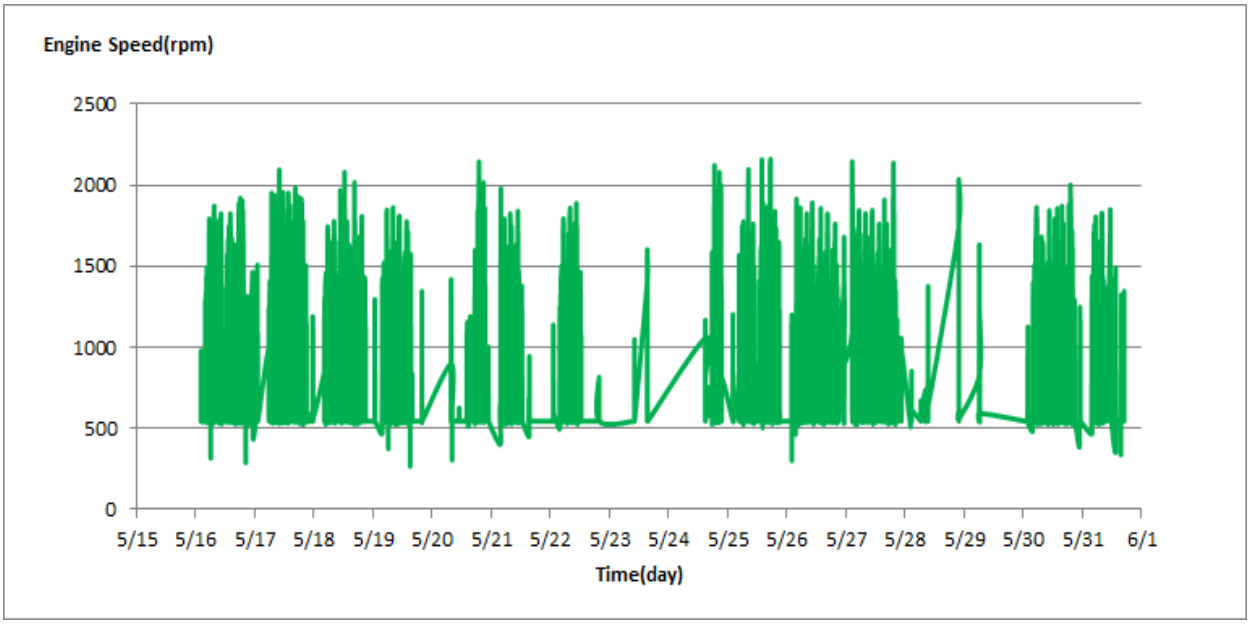


Figure 10- Engine speed distribution over sixteen days

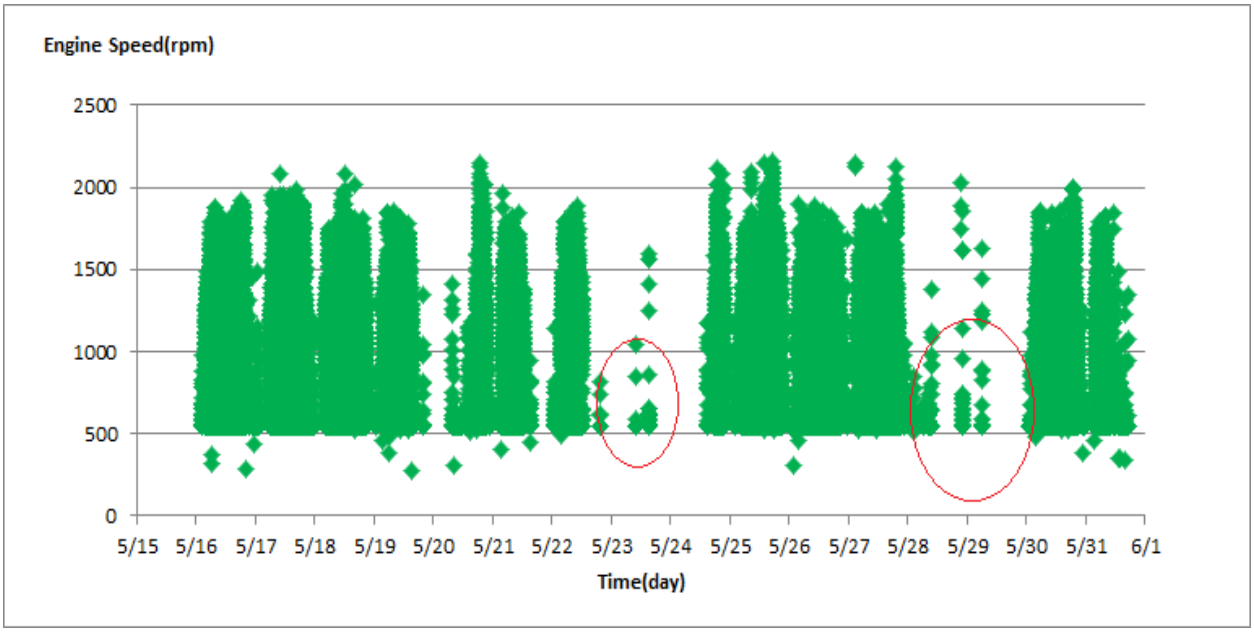


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

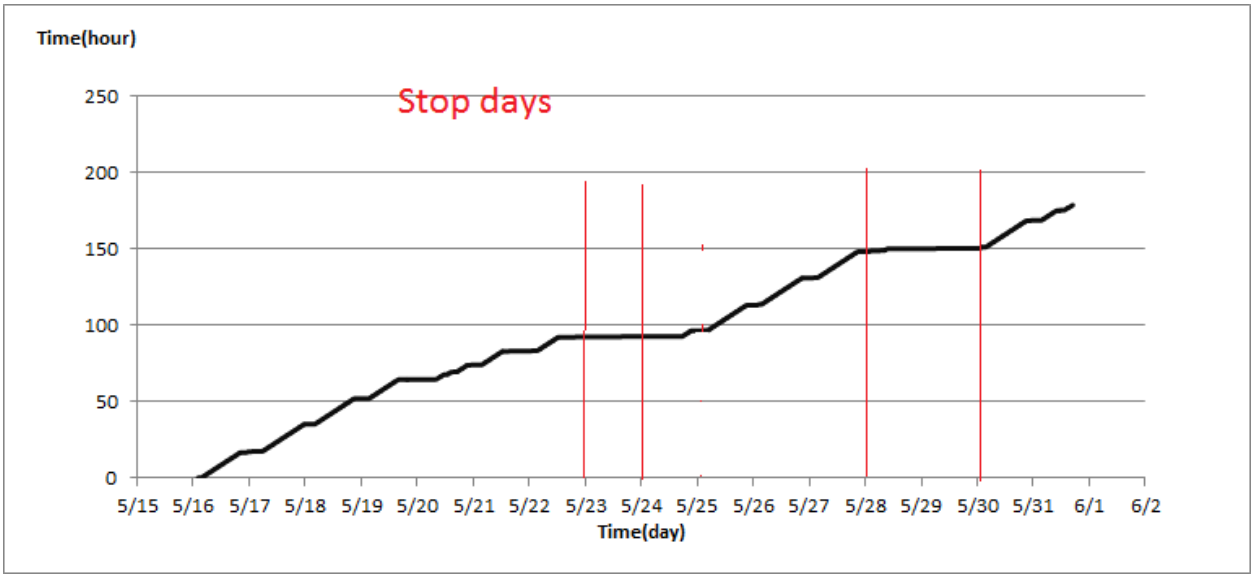


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

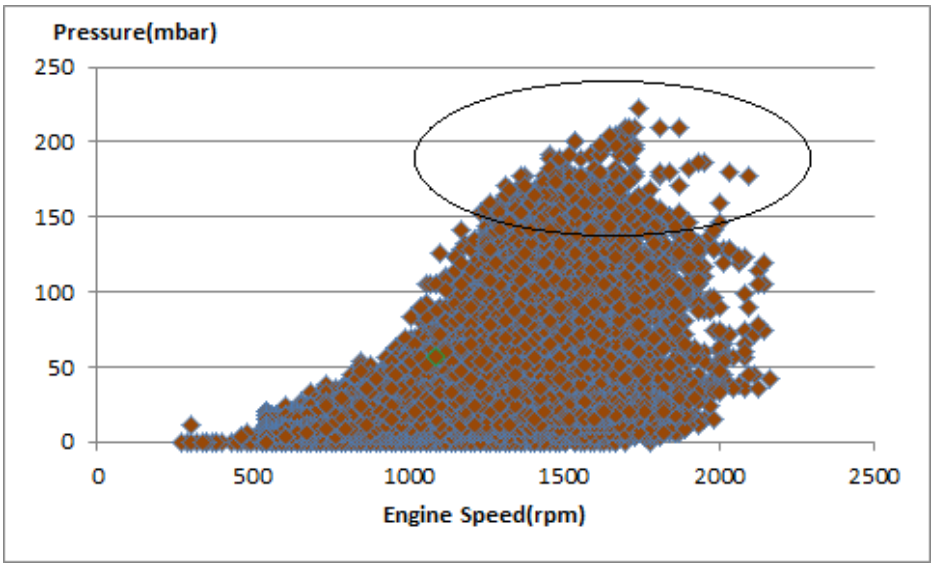


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

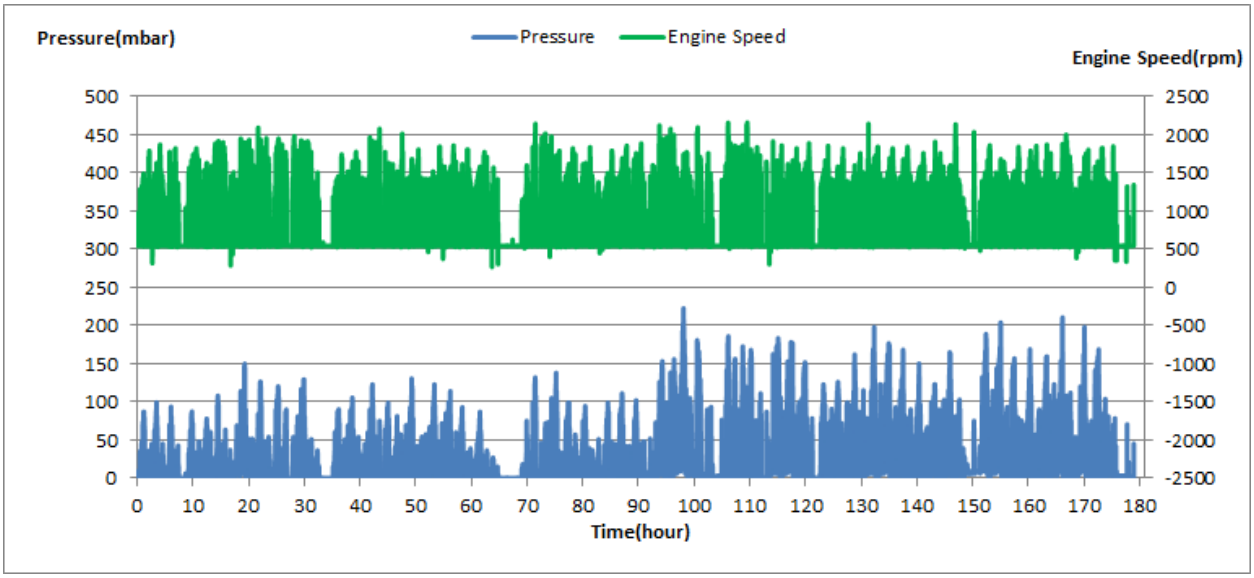


Figure 14- P,N distribution vs. working hours

Notice: Active regeneration can't be observed in this period.

Temperature- Engine Speed Diagram

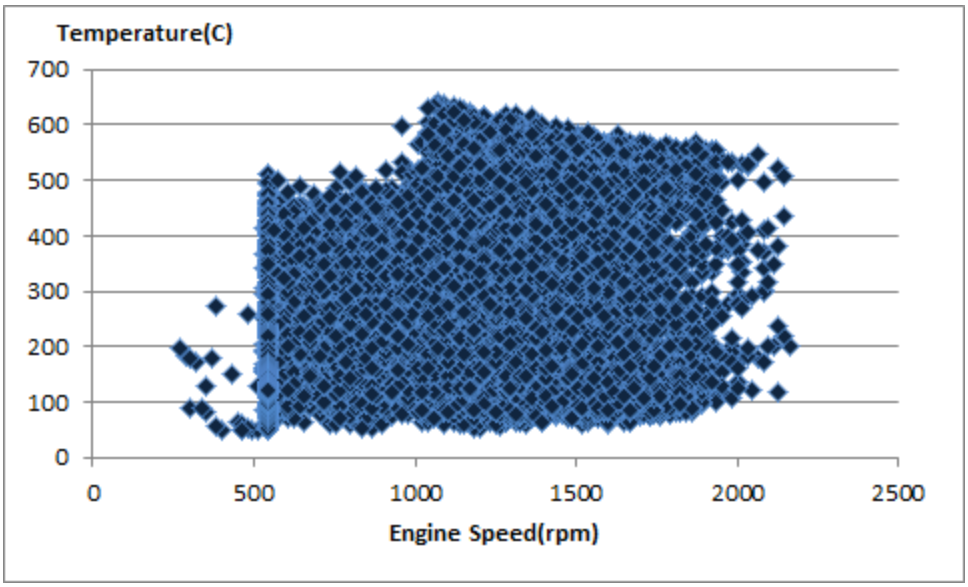


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

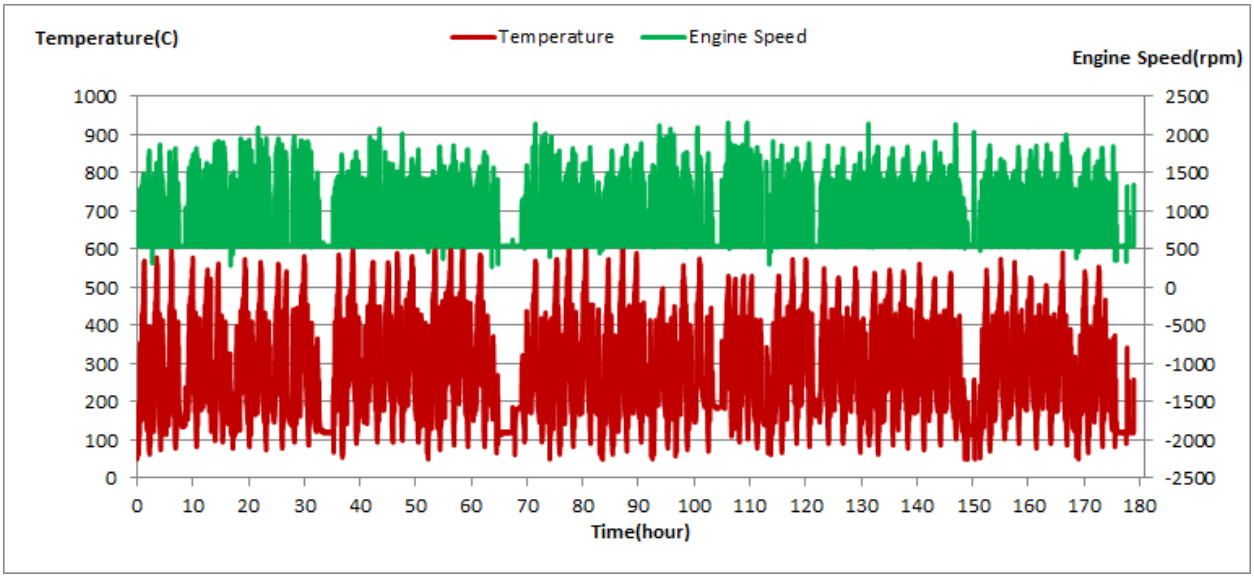


Figure 16- T, N distribution vs. working hours

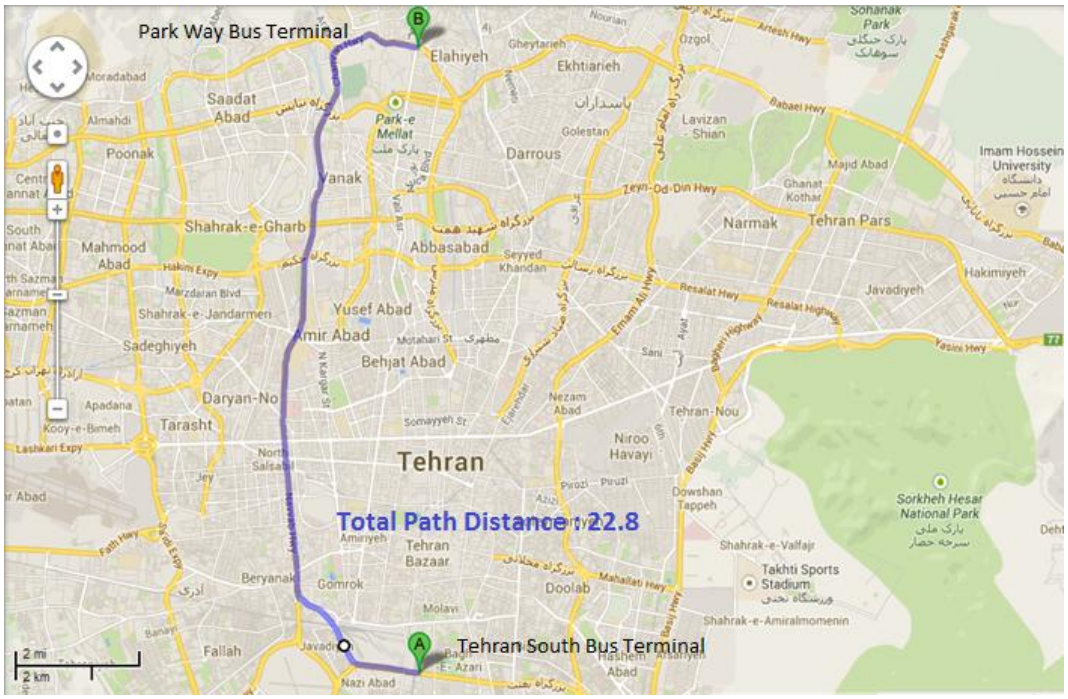
Filter Operation Analysis

- As depicted in Figure 1, only 0.02% of total working-time pressure is above 200 mbar and 0.5% above 150mbar. So it can be concluded that operation of this filter is reasonably acceptable in this condition.
- 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 20% above 350°C.
- This vehicle operates in line 4 and for its path characteristic, engine operates in high speed.

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

All right reserved by ASA company – confidential no passing to third parties.

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



All right reserved by ASA company – confidential no passing to third parties.

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 (Passive system with FBC)
Installation date	22/Oct/2014
Report period	1/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.01 $[m^{-1}]$
K value – DPF 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

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	29103
Bus mileage over the period	763 km
Working days over the period	5 days
Stop days	10 days
Data logger working days	5 days
Working hours over the period	56.7 hours
Average working hours per a day (including stop days)	3.78 hours
Bus average speed	13.46 km/hr
idle speed time to all working time ration	60%
Total Bus fuel consumption over the period	398 lit
fuel consumption per hour	6.97 lit/hr
Average fuel consumption	0.52 lit/km
Total Bus additive consumption over the period	0.102 lit
Average additive consumption	0.134 cc/km
Additive consumption to fuel ration	252 cc per 1000 lit (Continuous Dosing)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

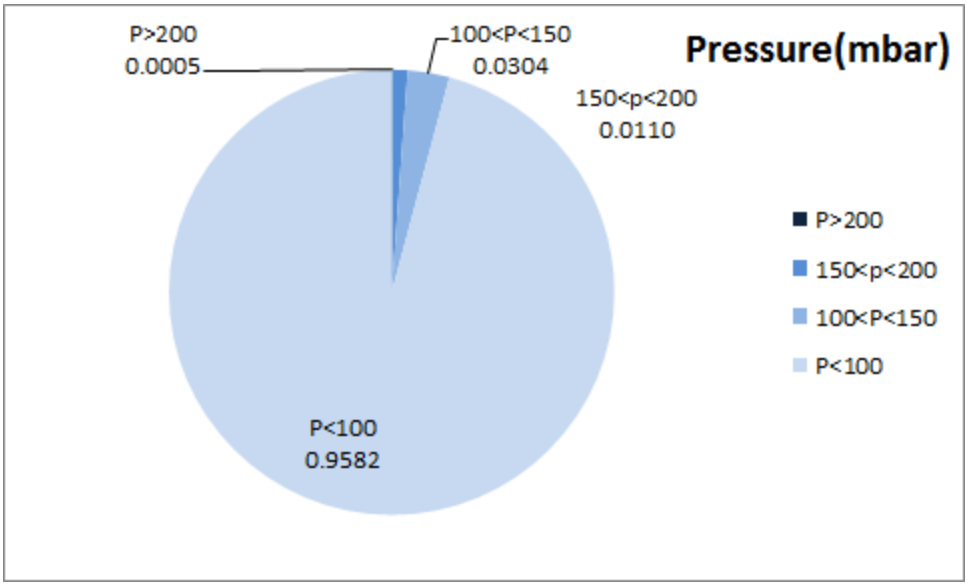


Figure 1- Pressure distribution over the working hours

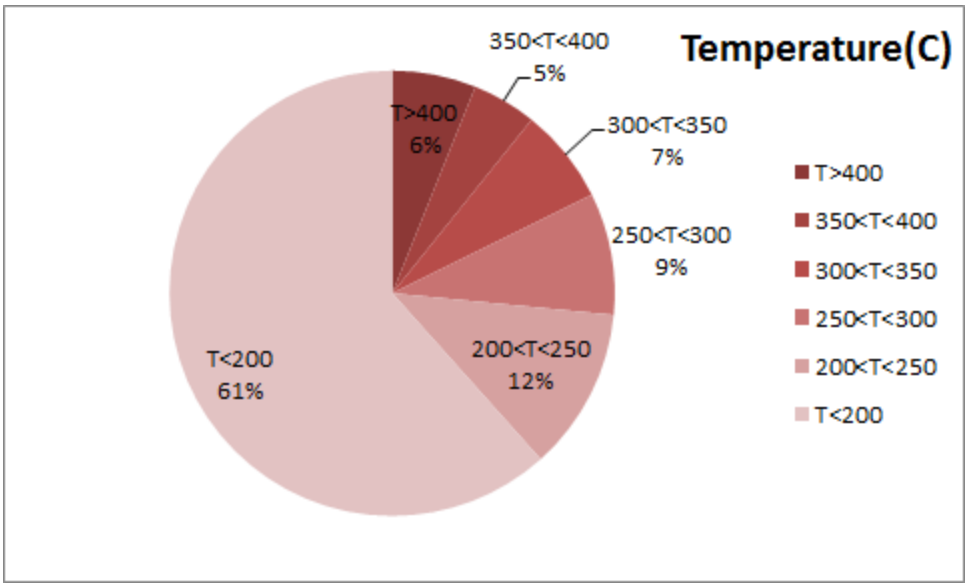


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

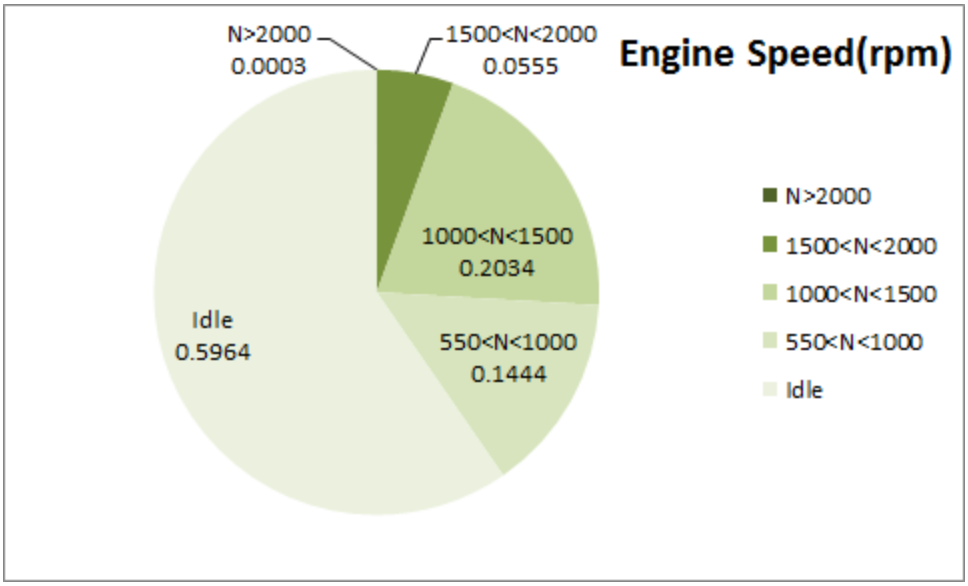


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
201.75	22.29	772

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
279.12	43.40	1117

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	213-0	2096-256

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

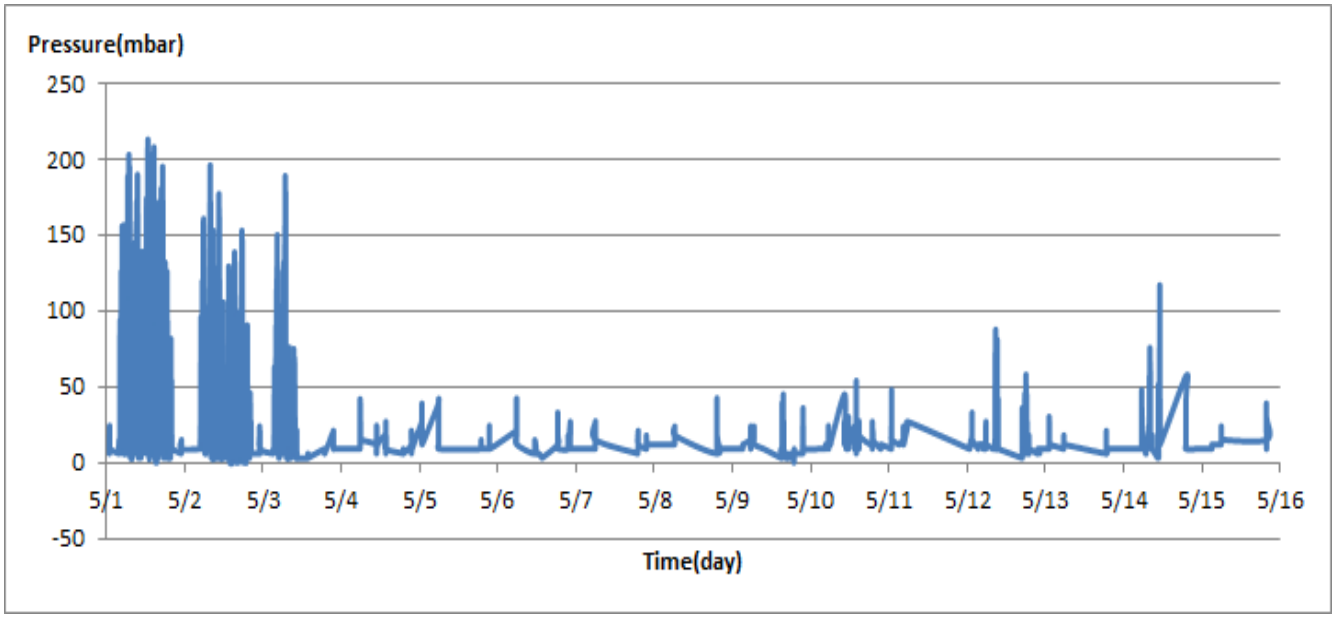


Figure 4- Pressure distribution over fifteen days

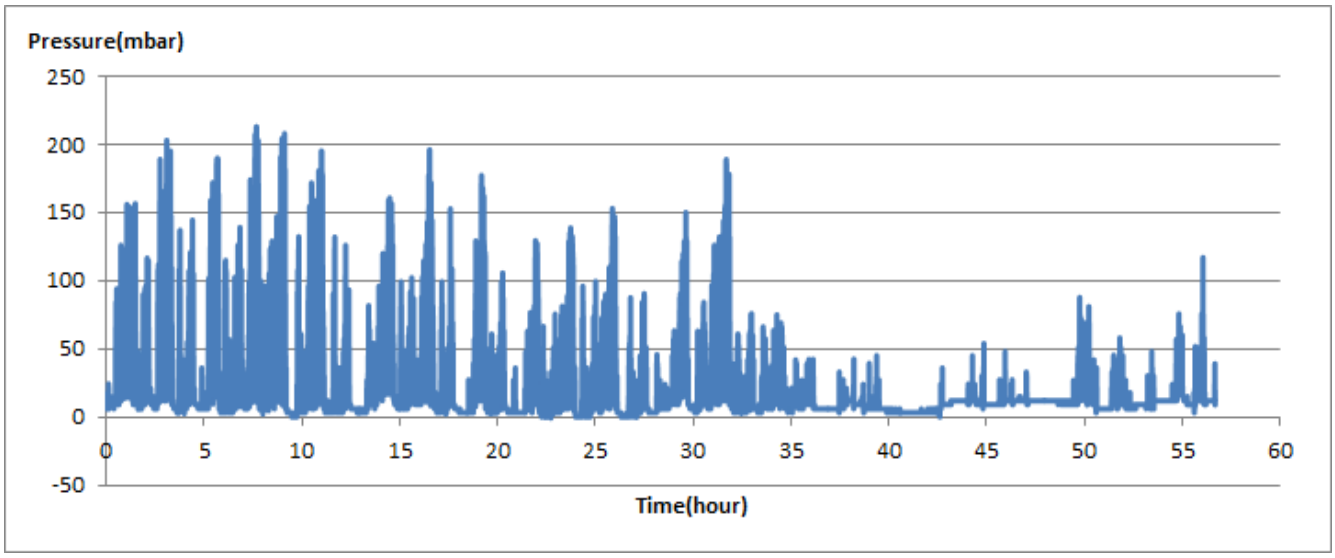


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

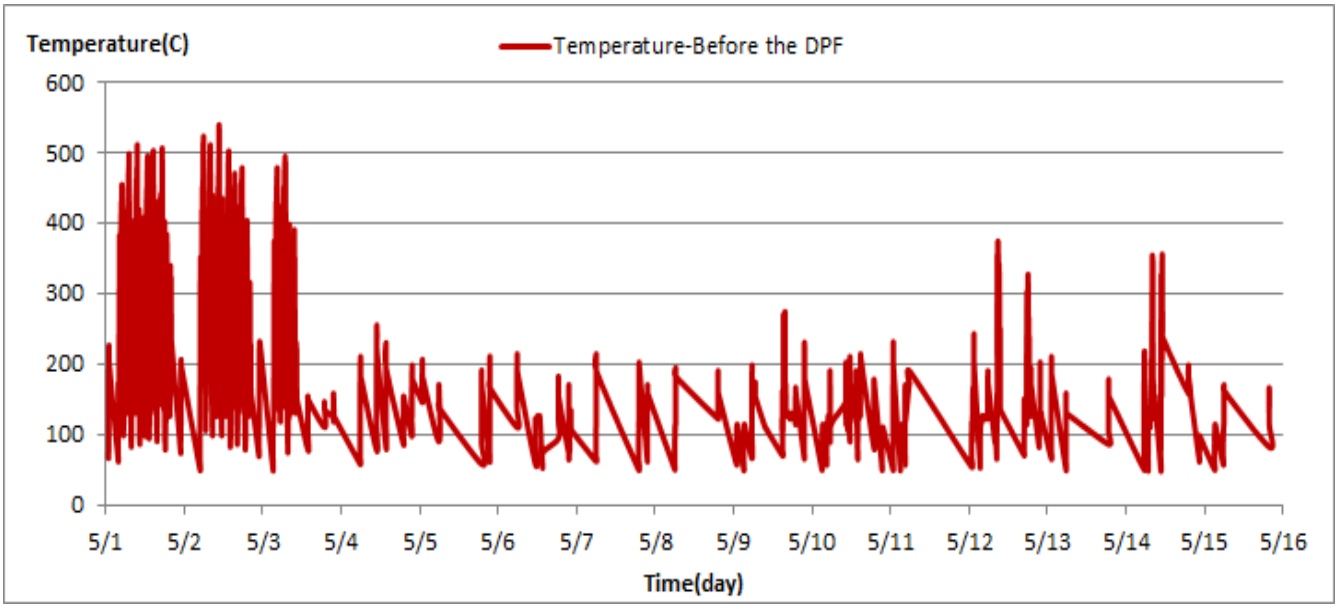


Figure 6- Temperature distribution over fifteen days

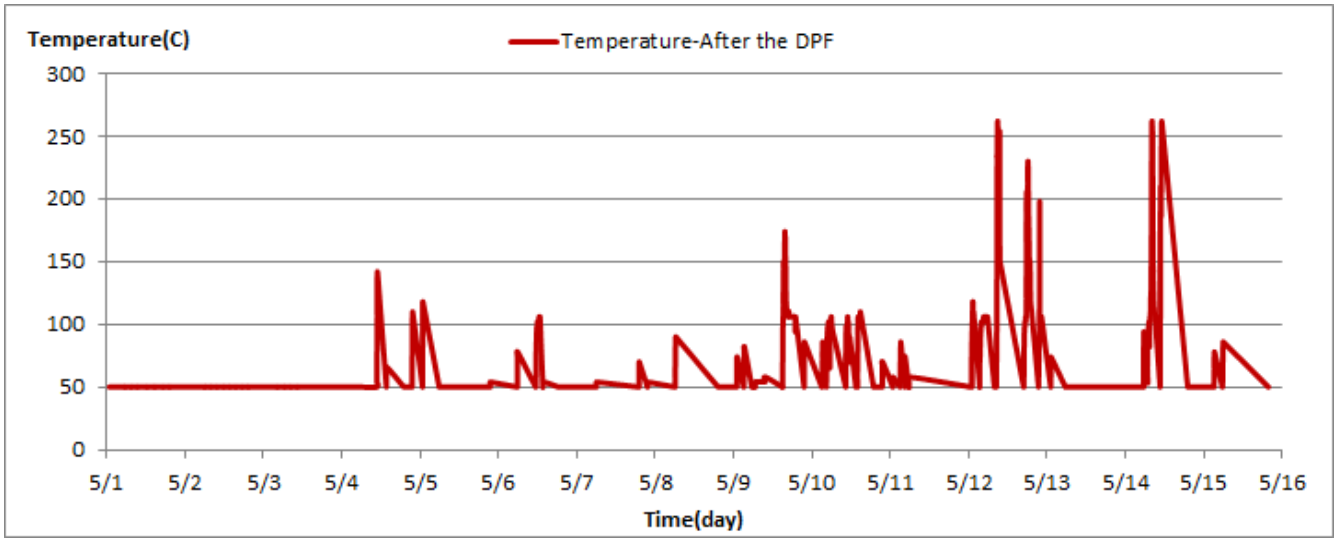


Figure 7- Temperature distribution over fifteen days

Notice: Temperature sensor for after the DPF installed on May 5th. So before this date CPK's showed 50°C.

All right reserved by ASA company – confidential no passing to third parties.

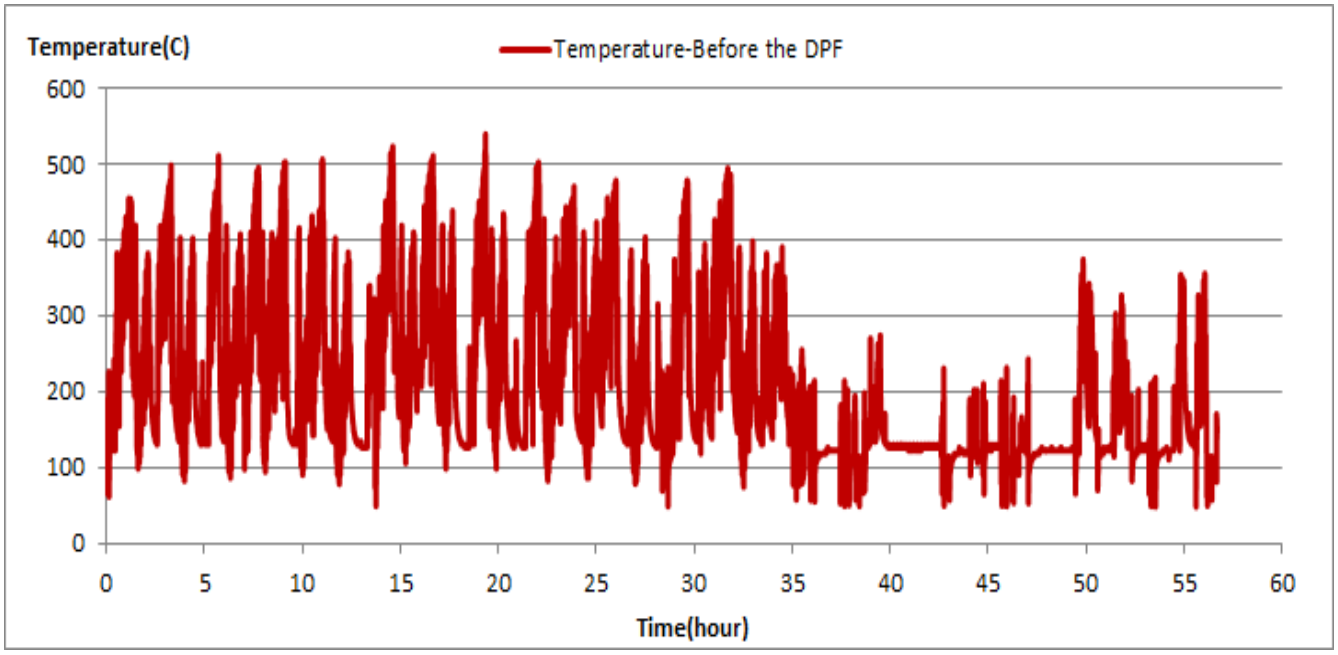


Figure 8- Before DPF temperature vs. working hours

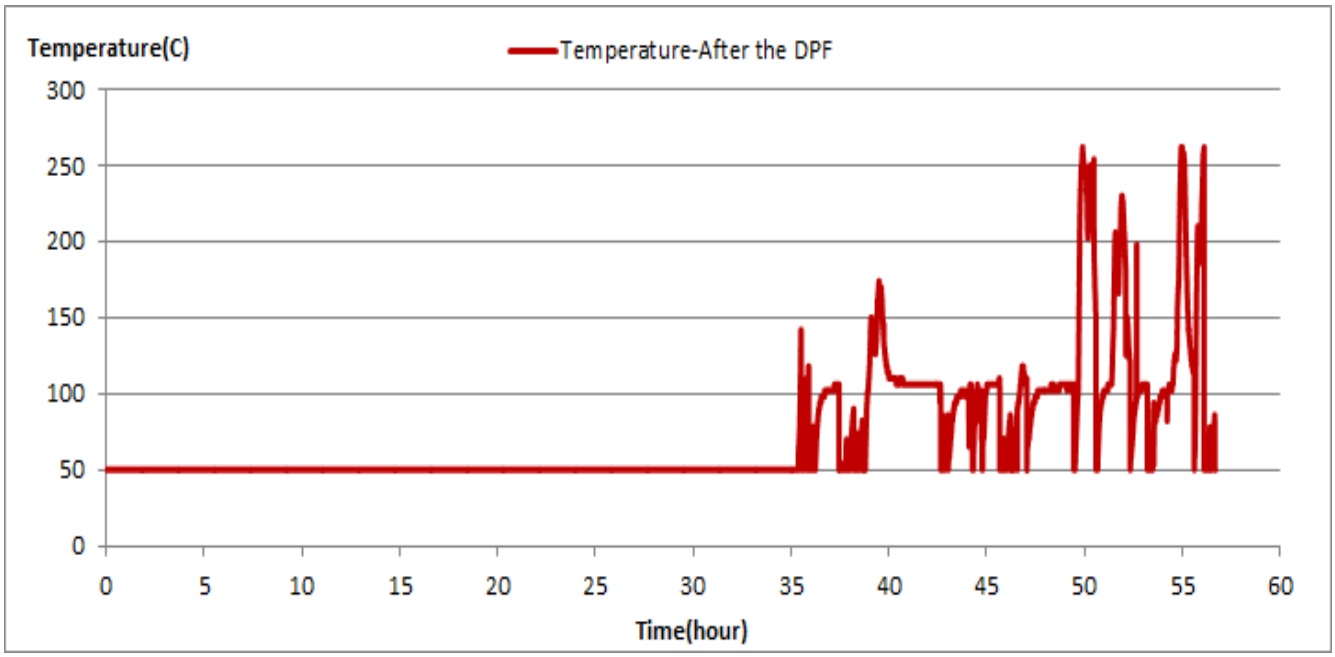


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

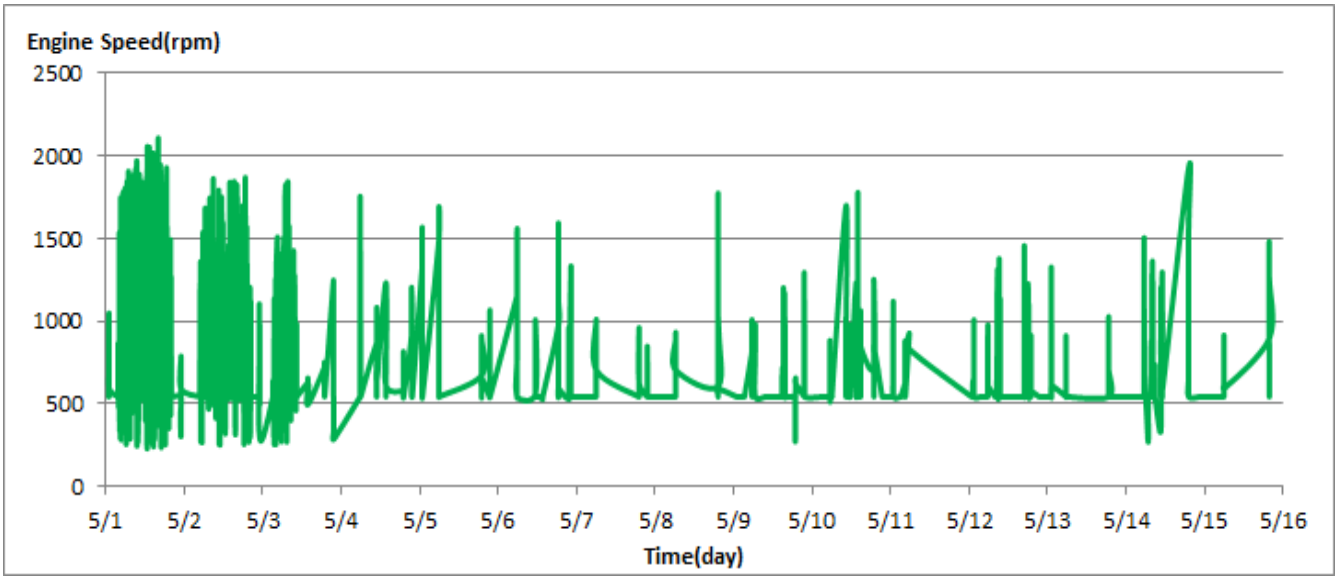


Figure 10- Engine speed distribution over fifteen days

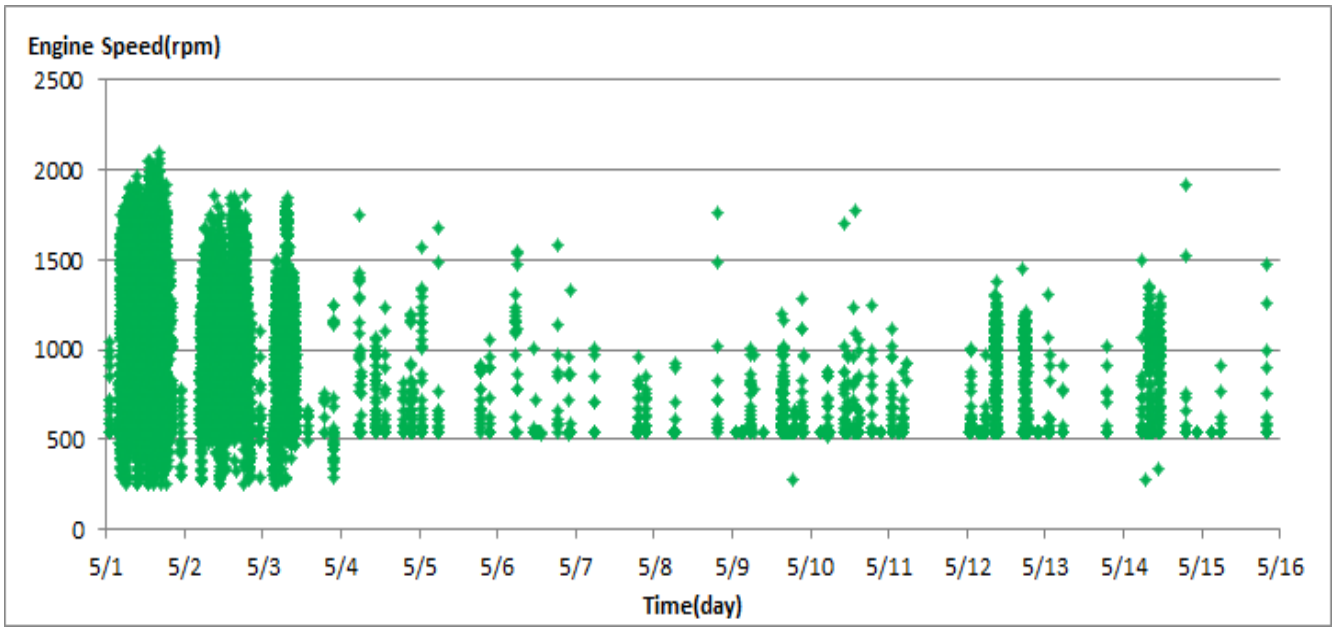


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

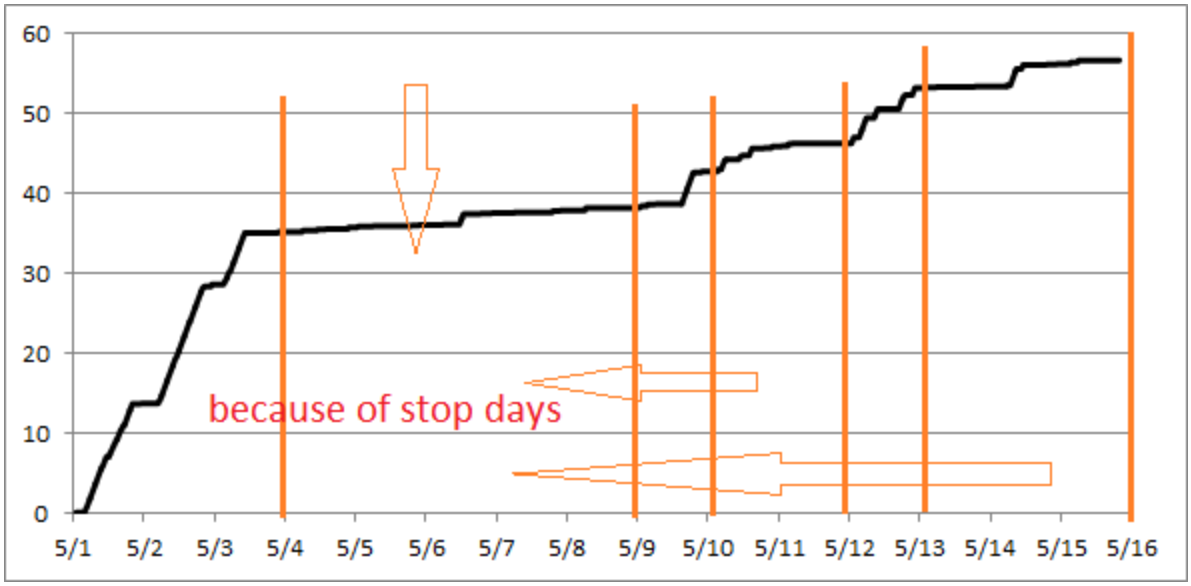


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

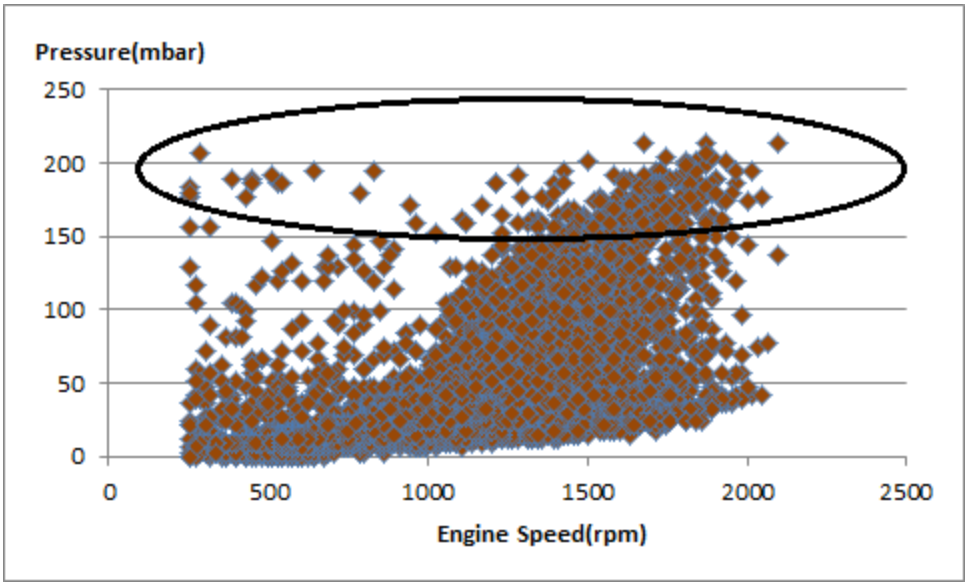


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

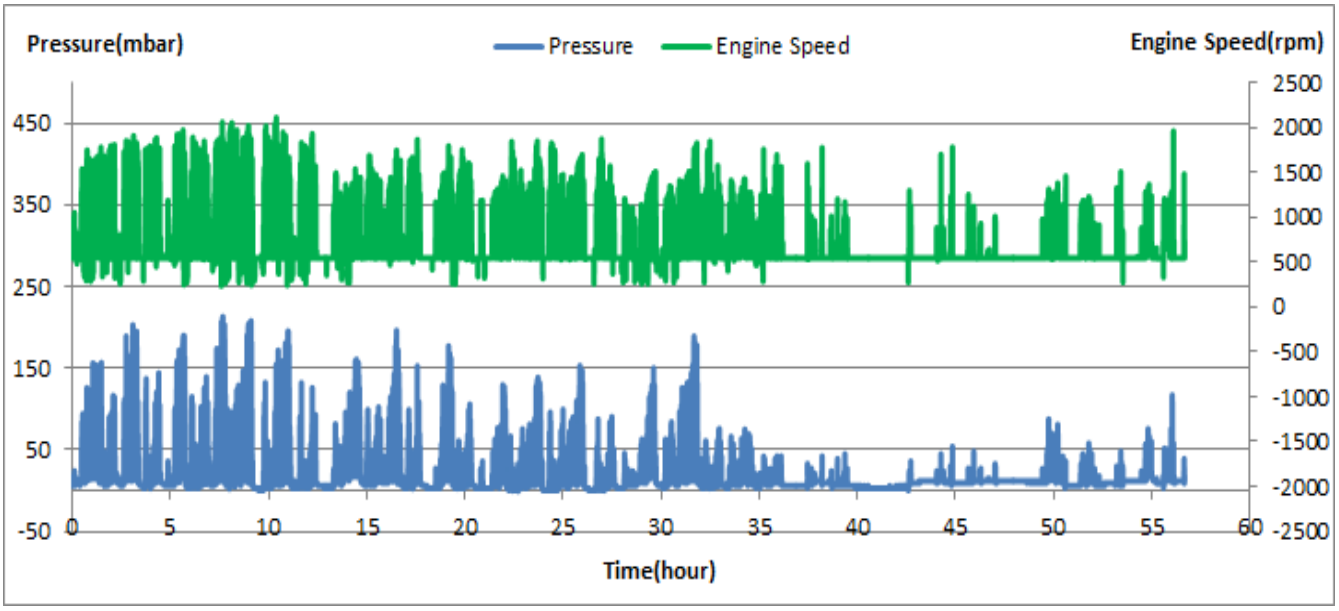


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

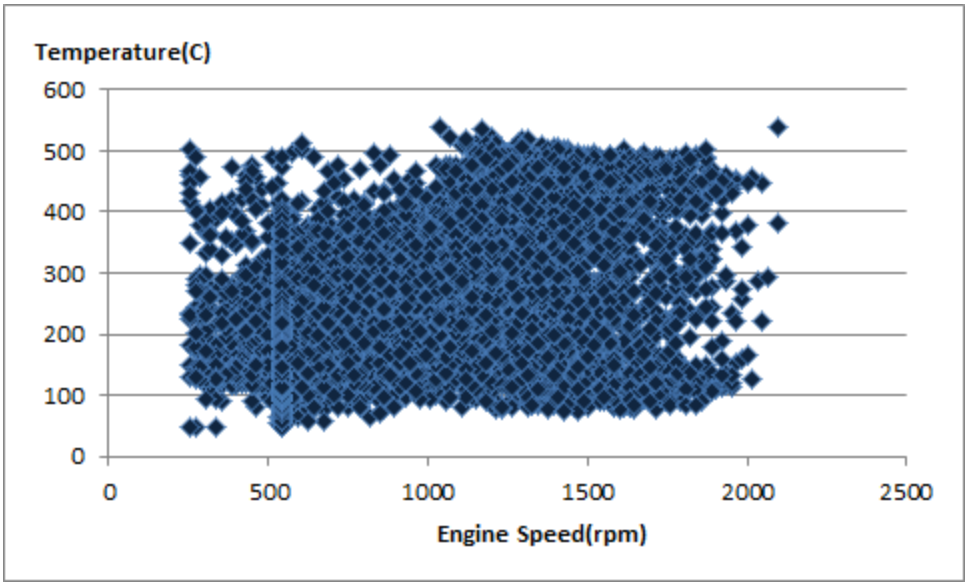


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

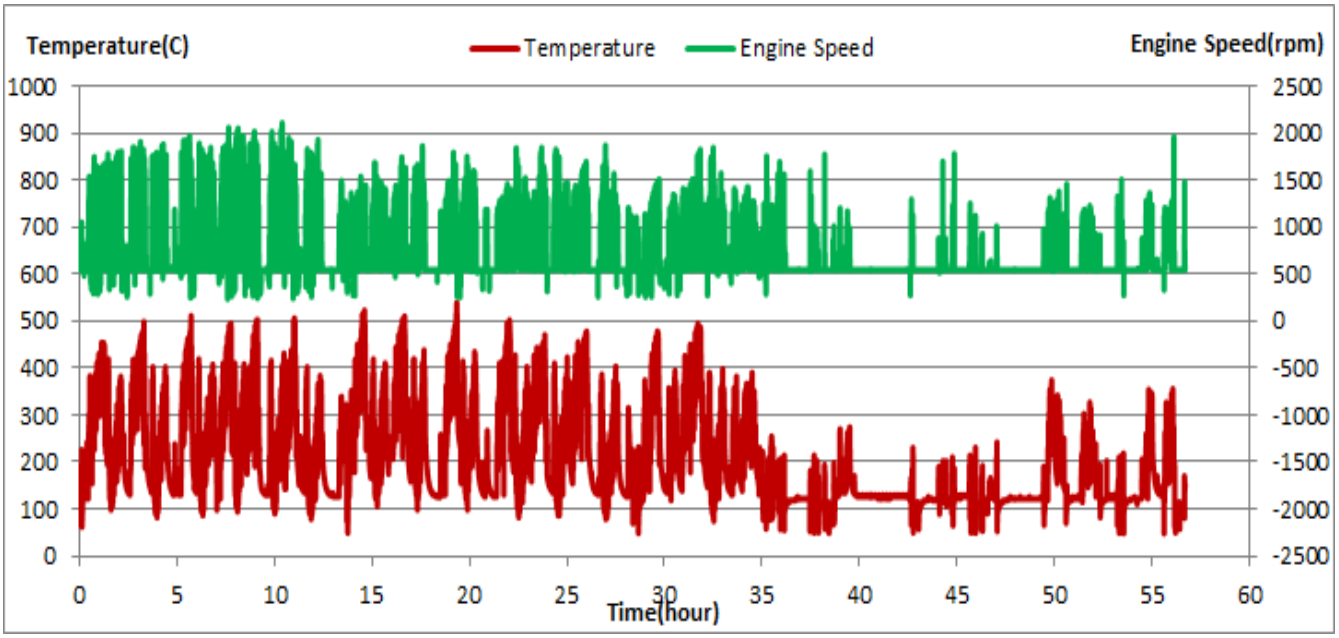


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, 0.05% of total working time pressure is above 200 mbar and 3.05% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that only 6% of total working time temperature is above 400 °C and 11% above 350°C. It is worth-mentioning this low temperature distribution was result of high idle working during this period.

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

All right reserved by ASA company – confidential no passing to third parties.

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 (Passive system with FBC)
Installation date	22/Oct/2014
Report period	16/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.01 $[m^{-1}]$
K value - DPF 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 February 15th.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	31006 km
Bus mileage over the period	1903 km
Working days over the period	9 days
Stop-working days (based on bus company report)	7 days
Data logger working days	9 days
Working hours over the period	129.3 hours
Average working hours per a day (including stop days)	8.08 hours
Bus average speed	14.72 km/hr
idle speed time to all working time ration	54%
Total Bus fuel consumption over the period	1165 lit
fuel consumption per hour	9 lit/hr
Average fuel consumption	0.61 lit/km
Total Bus additive consumption over the period	0.293 lit
Average additive consumption	0.154 cc/km
additive consumption to fuel ration	252 cc per 1000 lit (Continuous Dosing)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

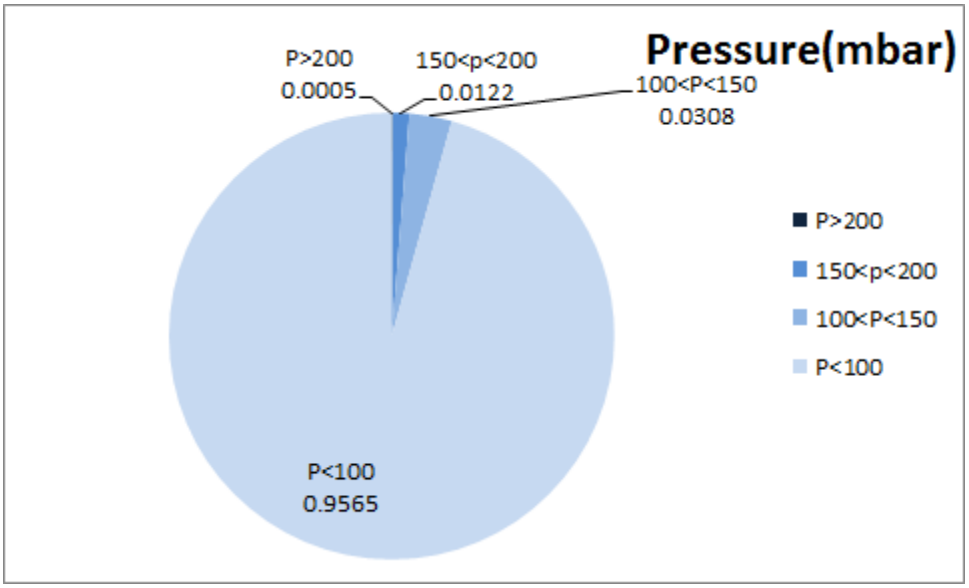


Figure 1- Pressure distribution over the working hours

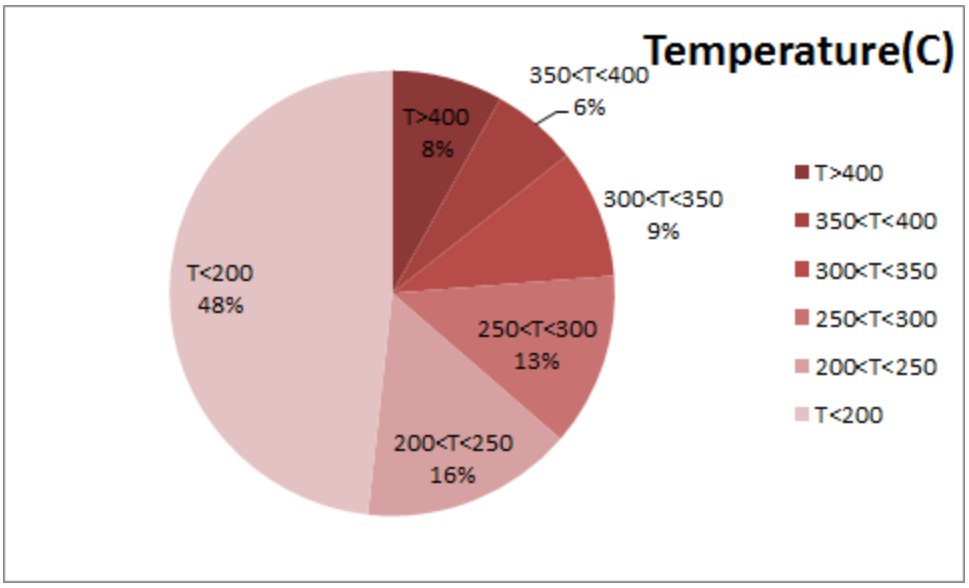


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

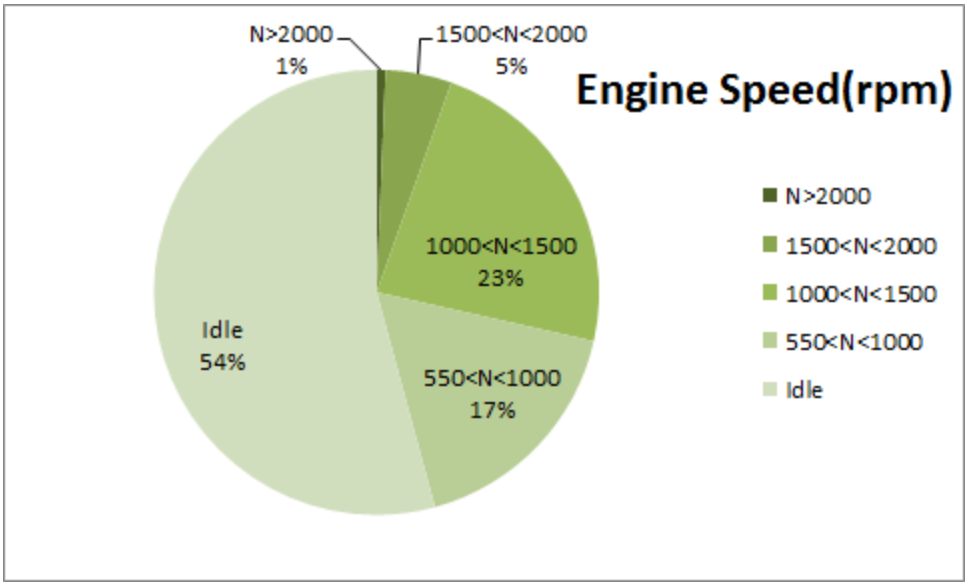


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
232.6	23.03	799

Table 4- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
295.8	41.7	1101

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	225-0	2672-288

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

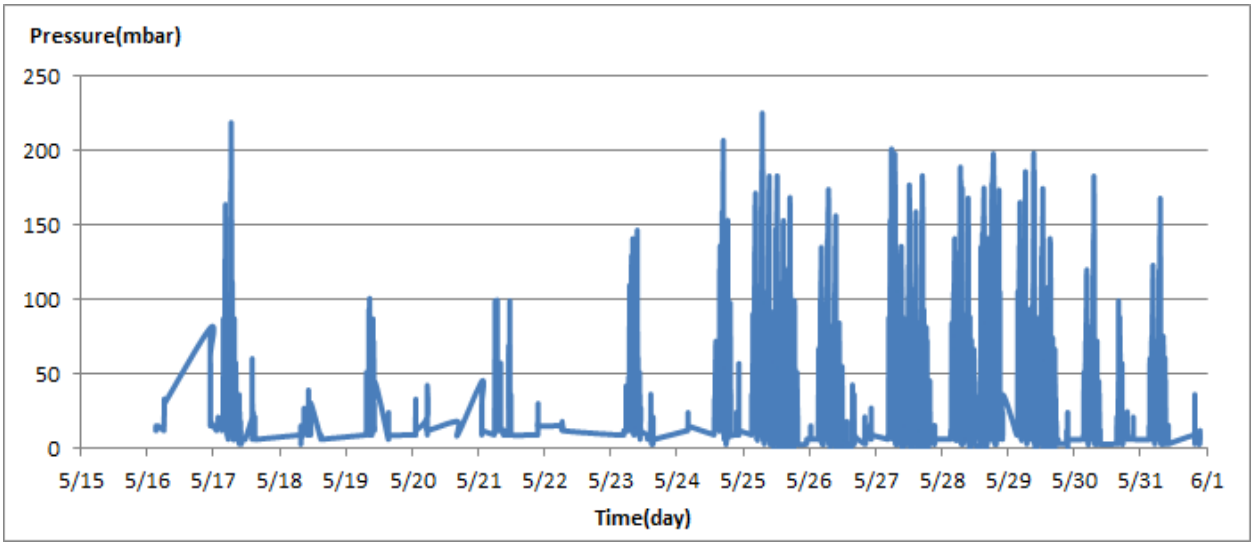


Figure 4- Pressure distribution over sixteen days

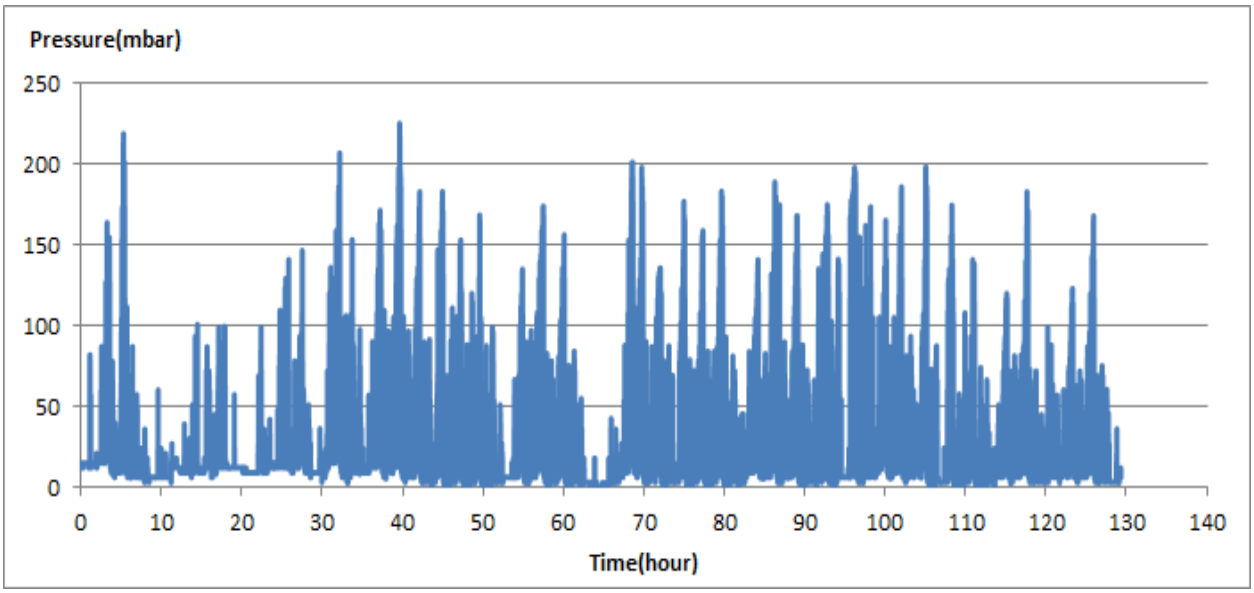


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

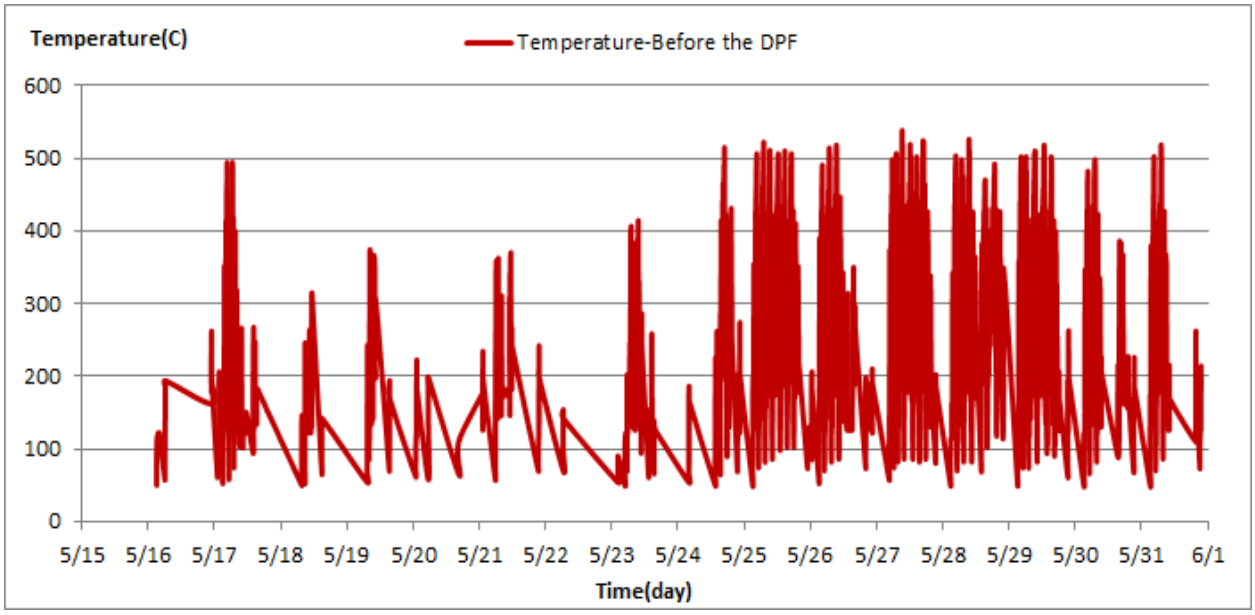


Figure 6- Temperature distribution over sixteen days

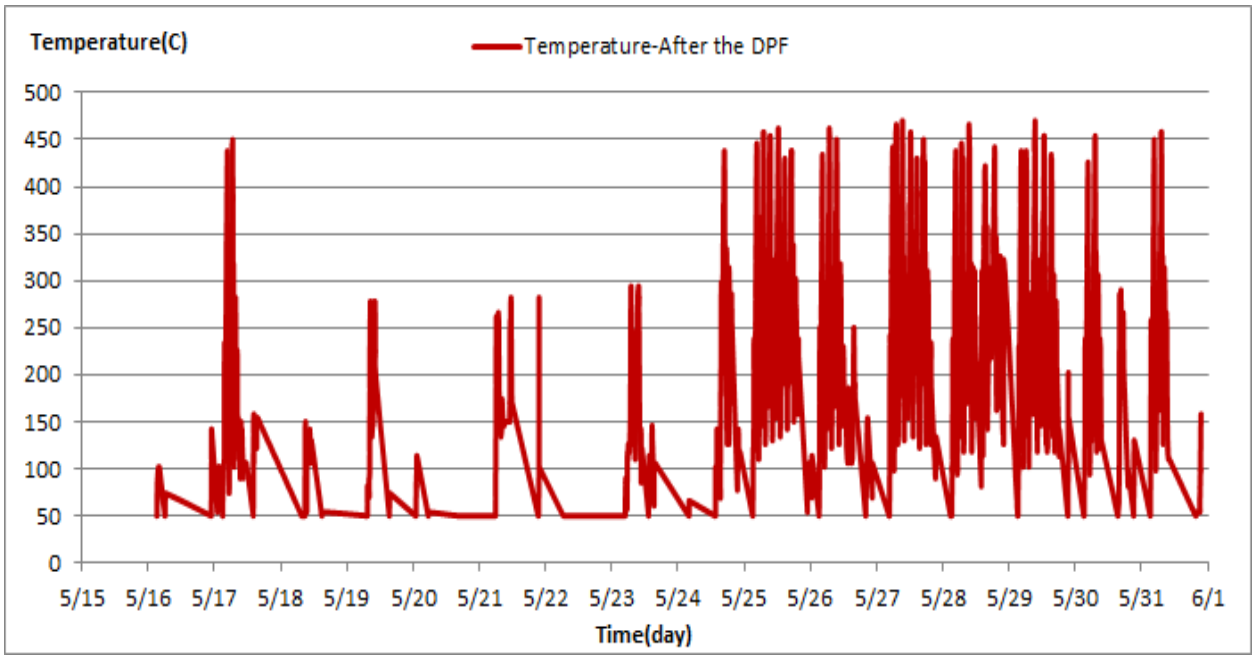


Figure 7- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

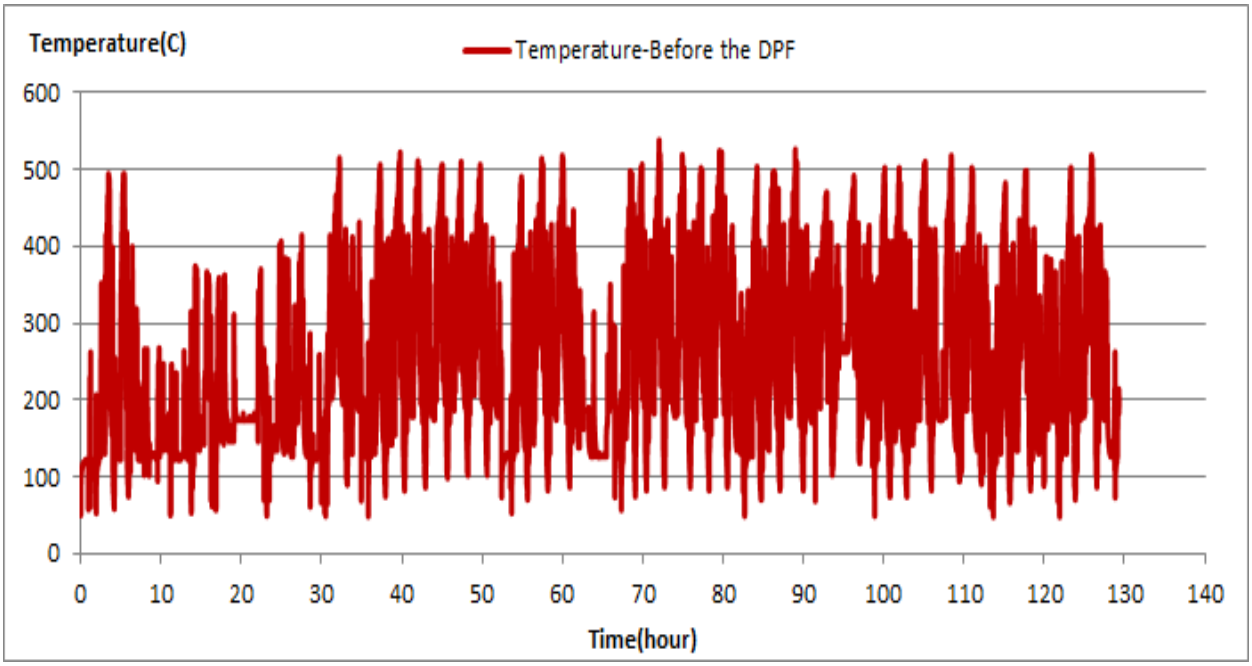


Figure 8- Before DPF temperature vs. working hours

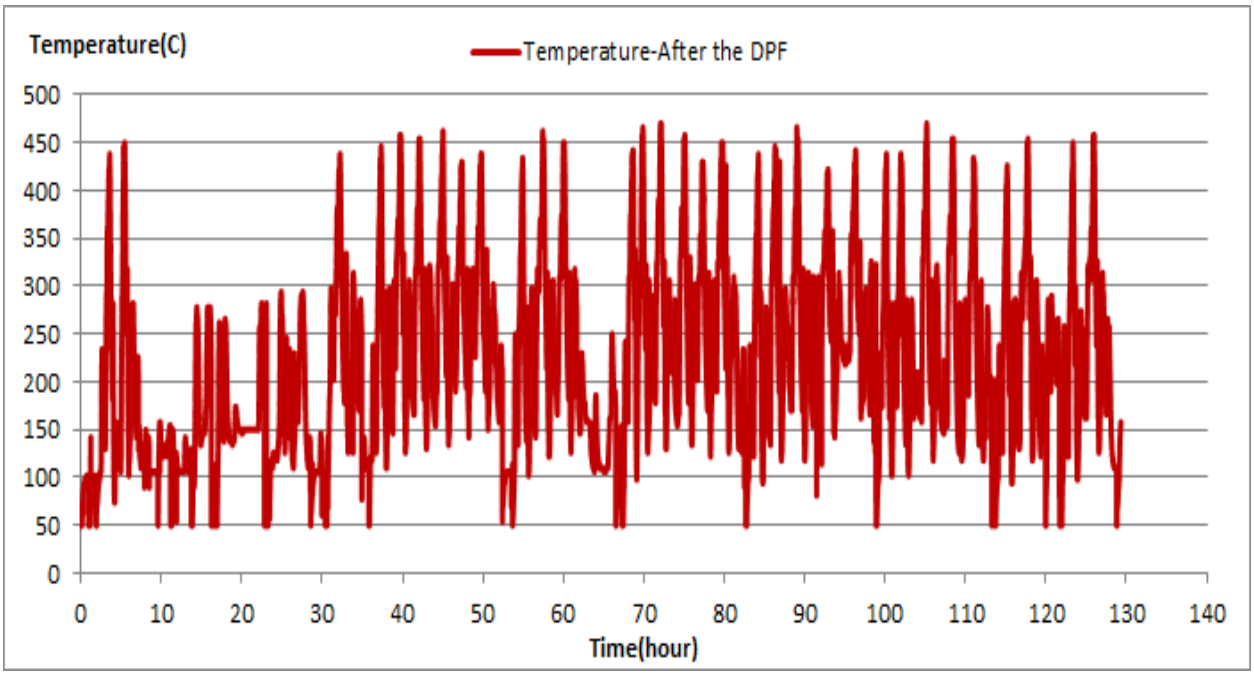


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

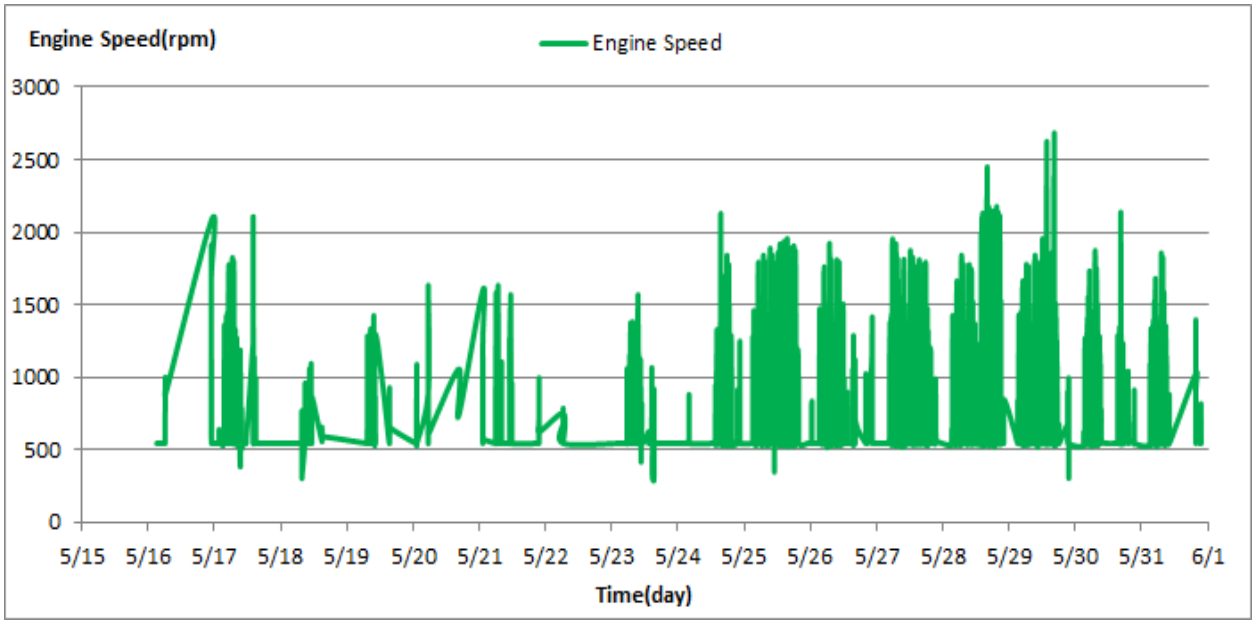


Figure 10- Engine speed distribution over sixteen days

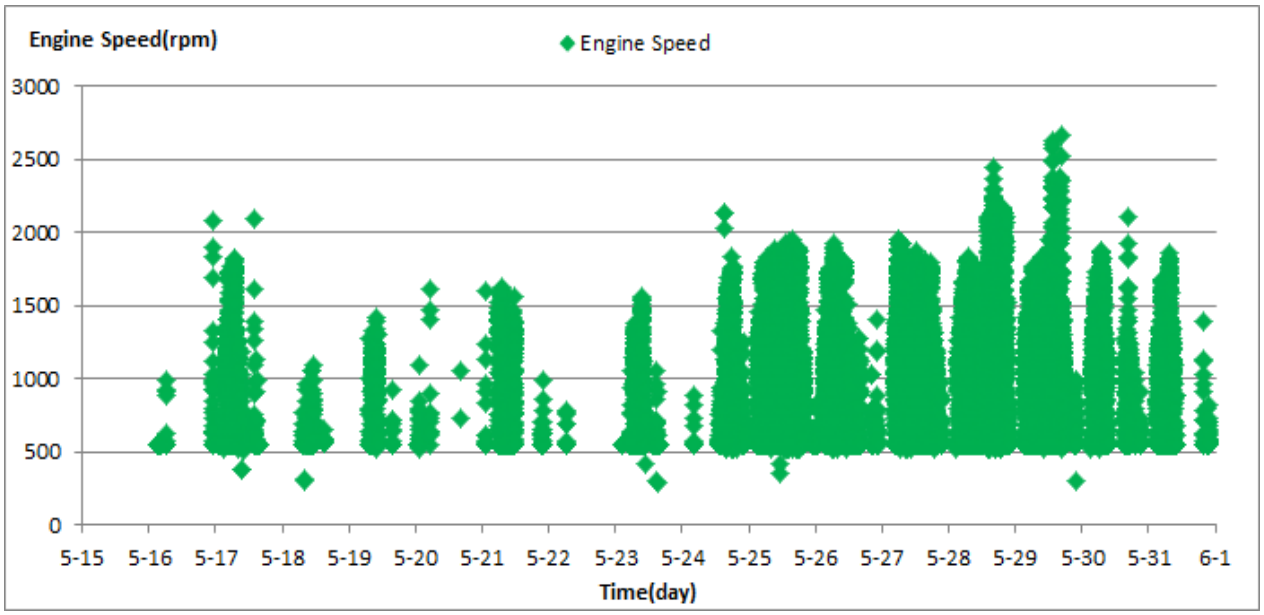


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

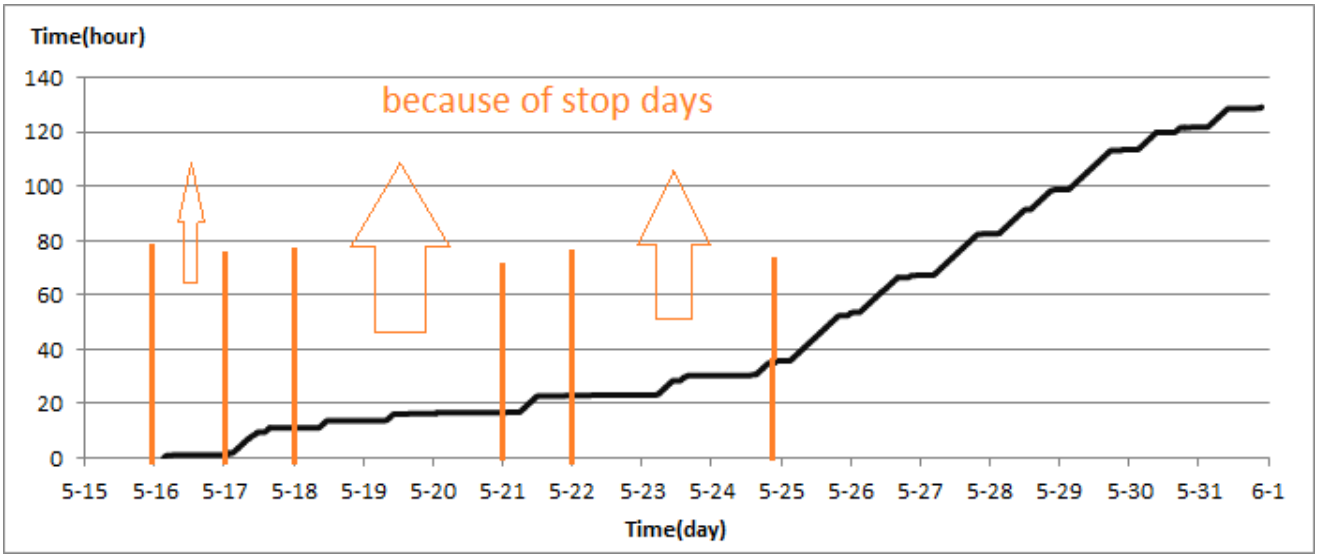


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

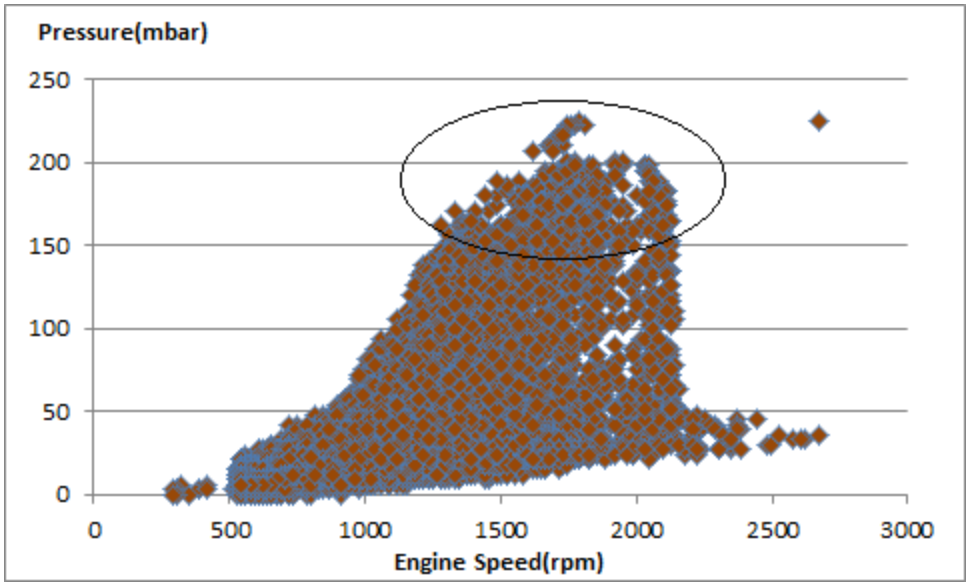


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

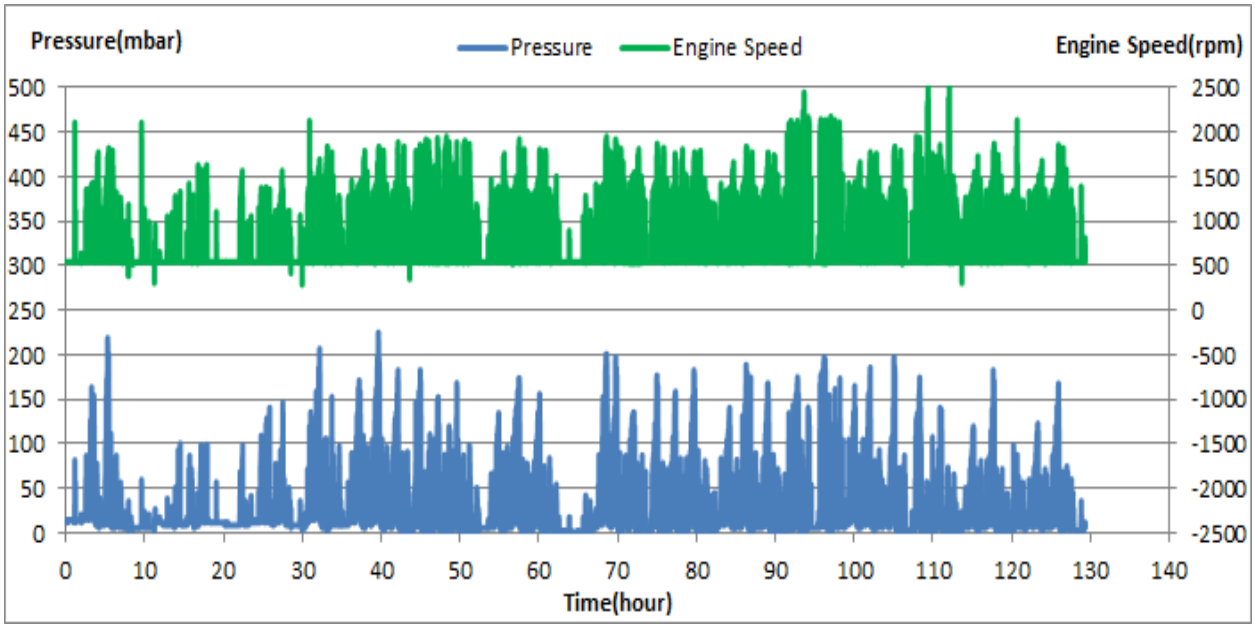


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

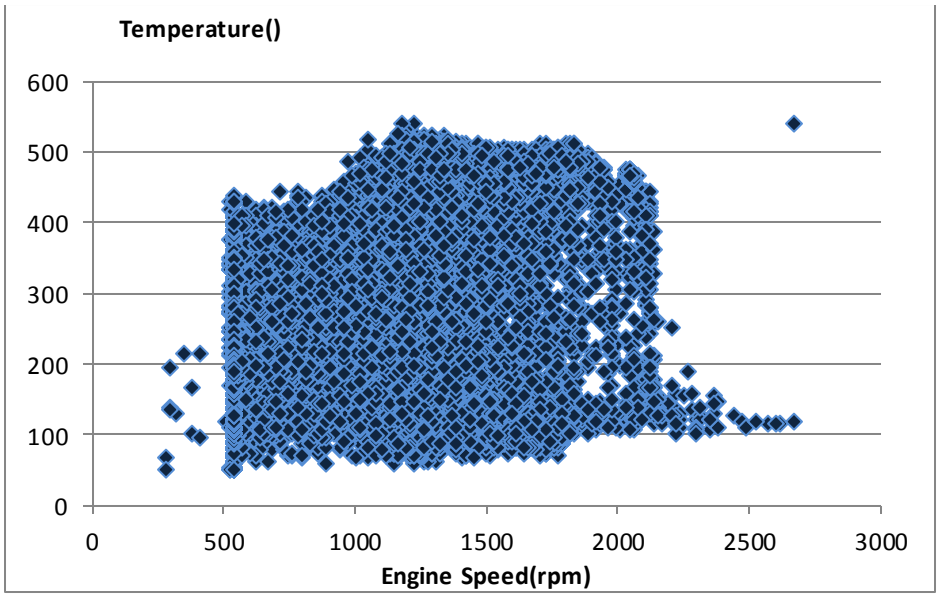


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

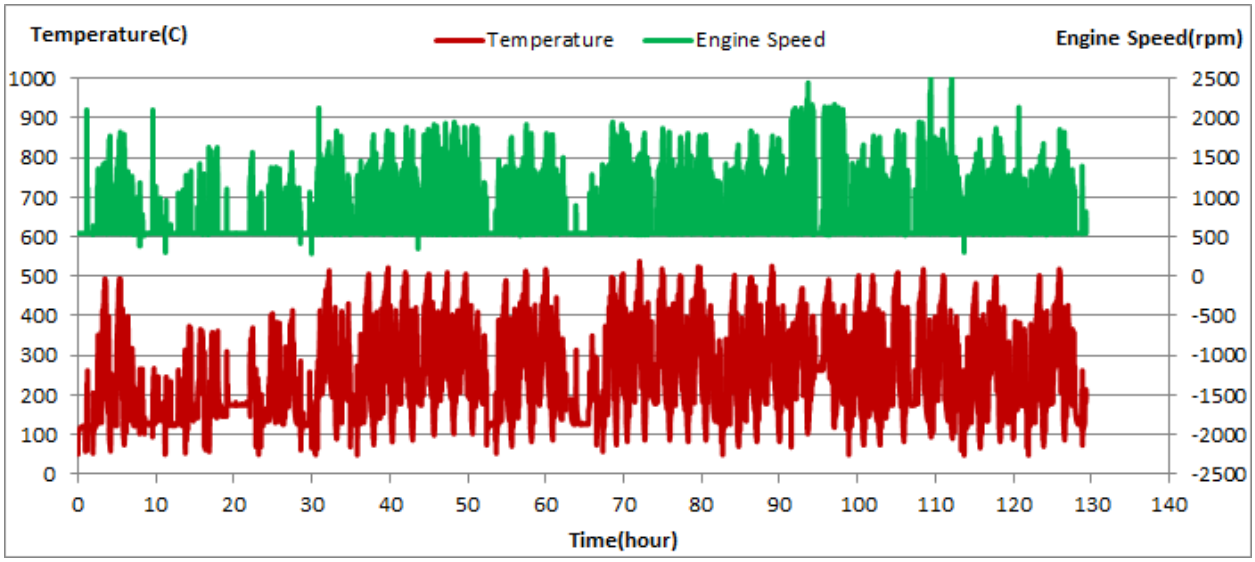


Figure 16- T, N distribution vs. working hours

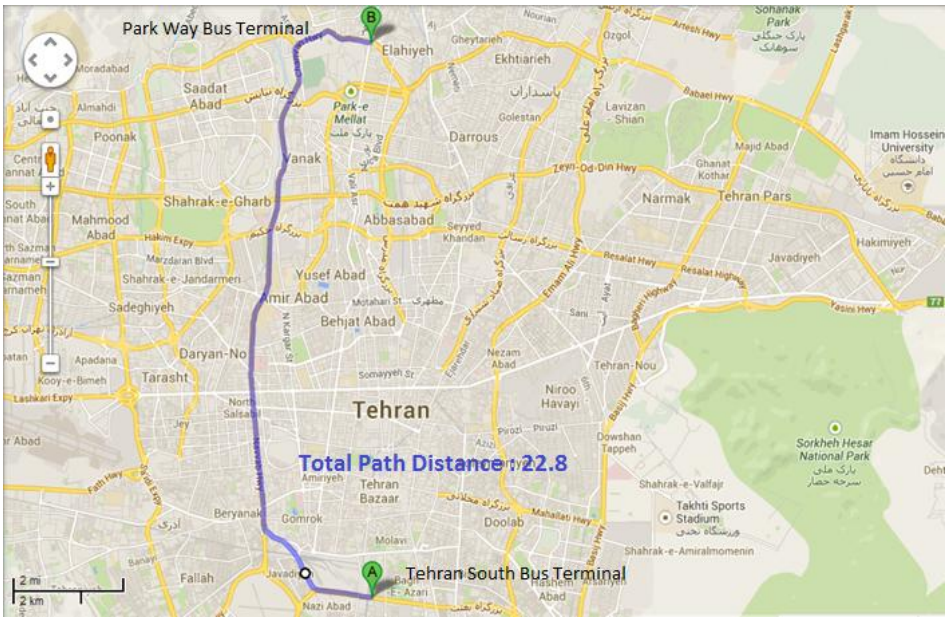
Filter Operation Analysis

- As depicted in Figure 1, 0.05% of total working-time pressure is above 200 mbar and 1.27% above 150mbar. So it can be concluded that operation of this filter is acceptable in this condition.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 8% of total working-time temperature is above 400 ℃ and 14% above 350℃.
- This vehicle operates in line 4 and for its path characteristic, engine operates in high speed.

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

All right reserved by ASA company – confidential no passing to third parties.

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



All right reserved by ASA company – confidential no passing to third parties.

Notice: During this period **data logger** of system had problem due to **bus electrical system**, so high lack of data was made results 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/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.60 $[m^{-1}]$
K value - DPF downstream	0.10 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	14421
Bus mileage over the period	2573 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	1764 lit
fuel consumption per hour	-
Average fuel consumption	0.68 lit/km
Total Bus additive consumption over the period	0.93 lit
Average additive consumption	0.357 cc/km
additive consumption to fuel ration	522 cc per 1000 lit (Batch Dosing with Tank Level)

Notice: because of **data logger problem** some information missed.

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

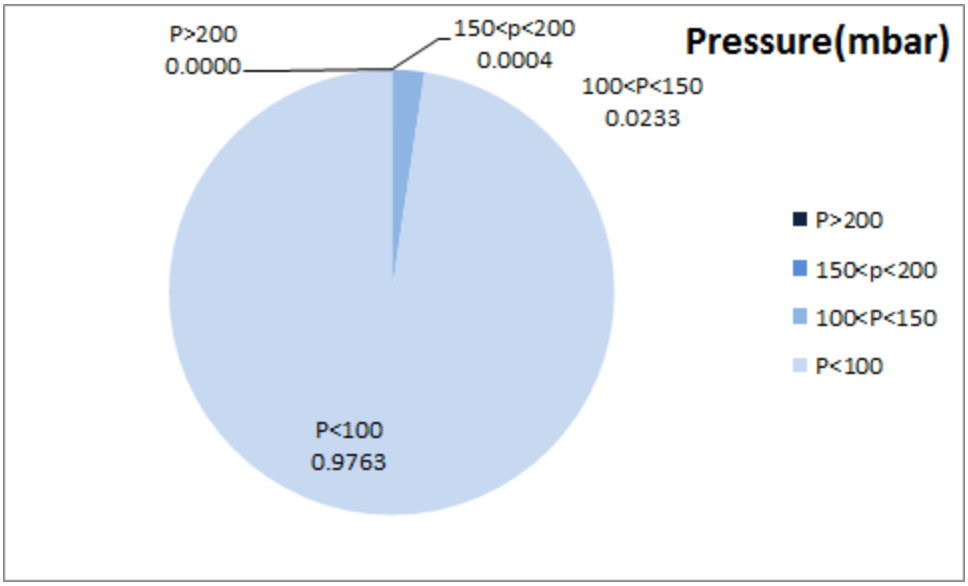


Figure 1- Pressure distribution over the working hours

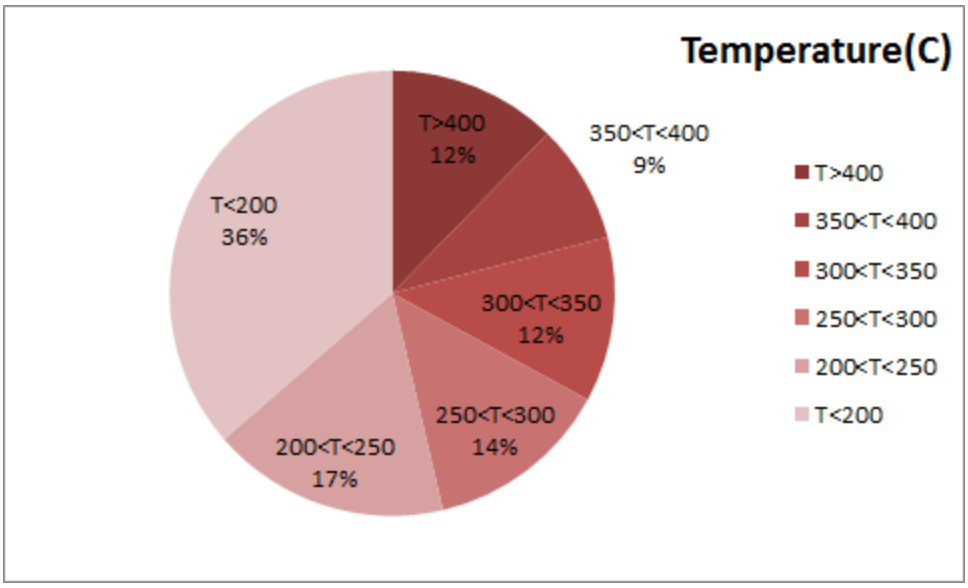


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

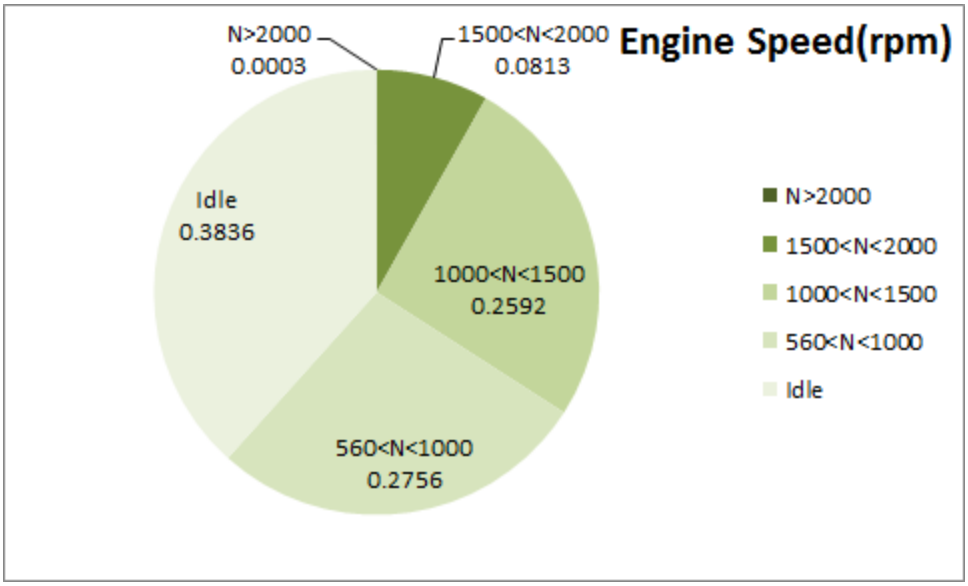


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
259.11	16.18	874

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
304.05	25.41	1075

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
582-50	165-0	2112-275

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

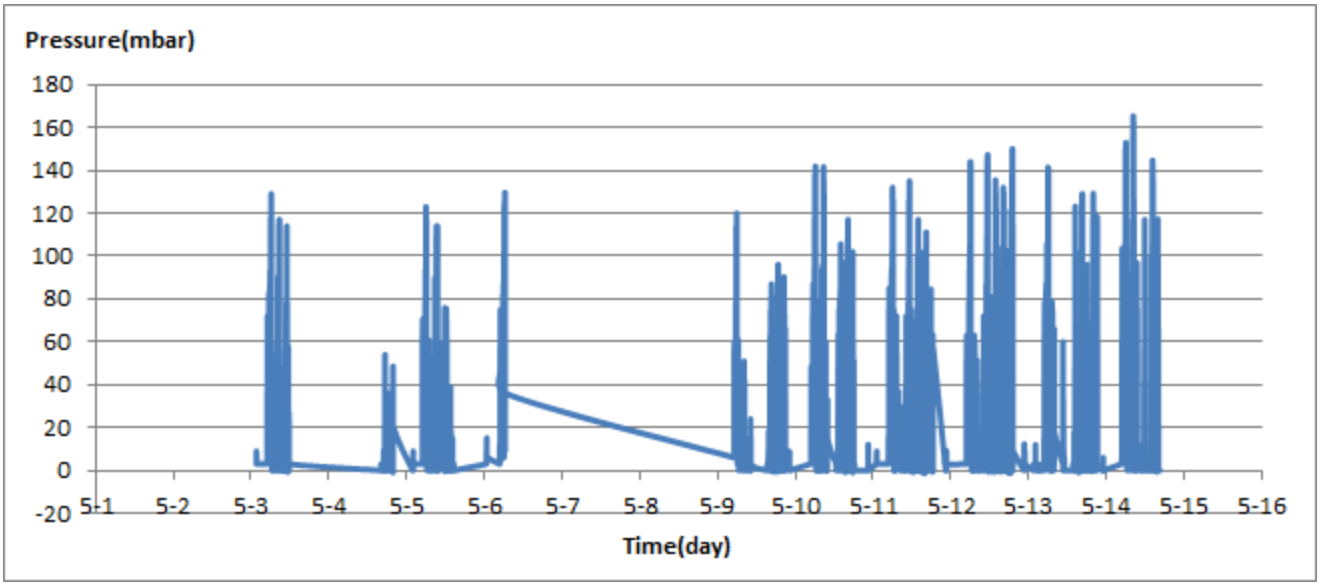


Figure 4- Pressure distribution over fifteen days

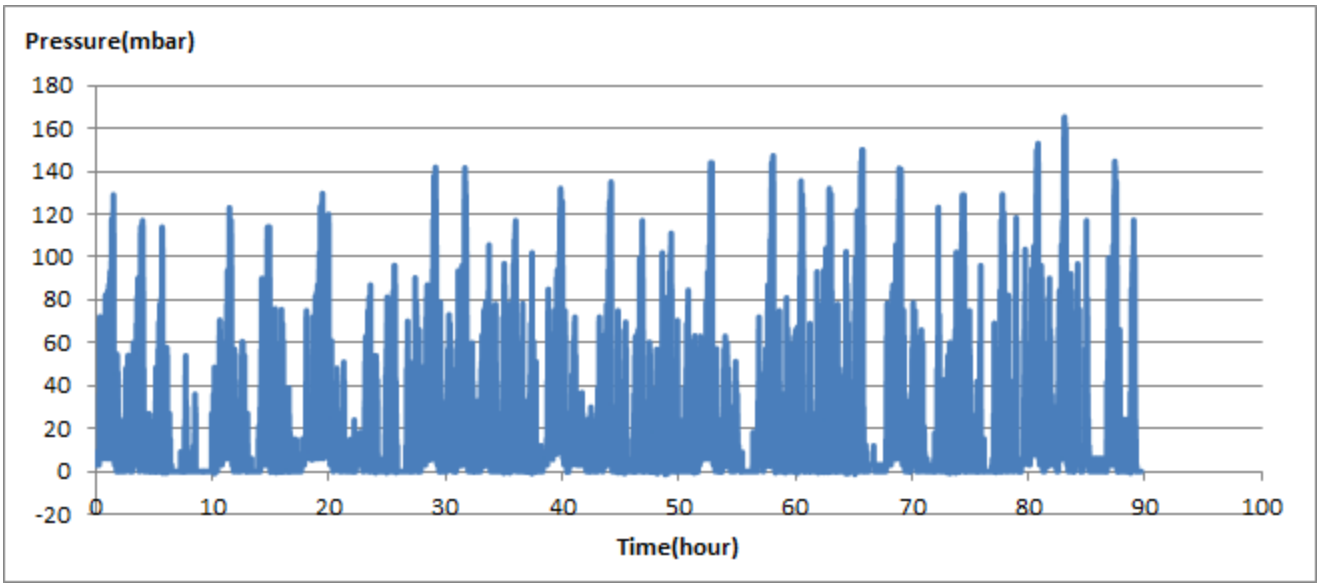


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

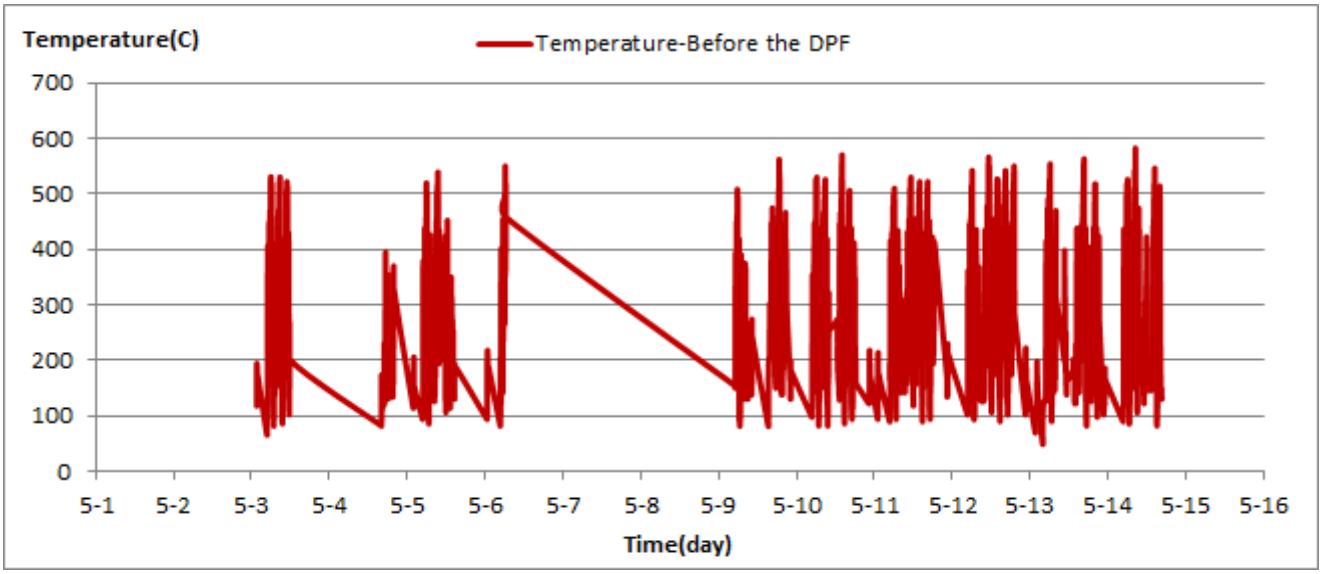


Figure 6- Temperature distribution over fifteen days

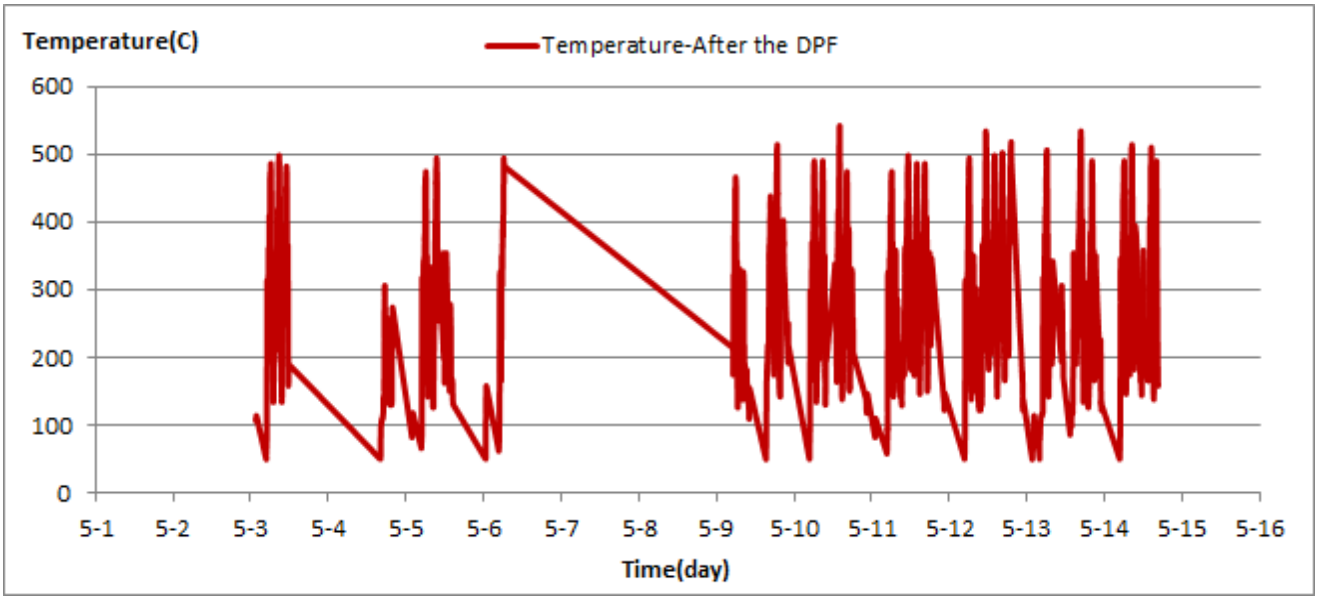


Figure 7- Temperature distribution over fifteen days

All right reserved by ASA company – confidential no passing to third parties.

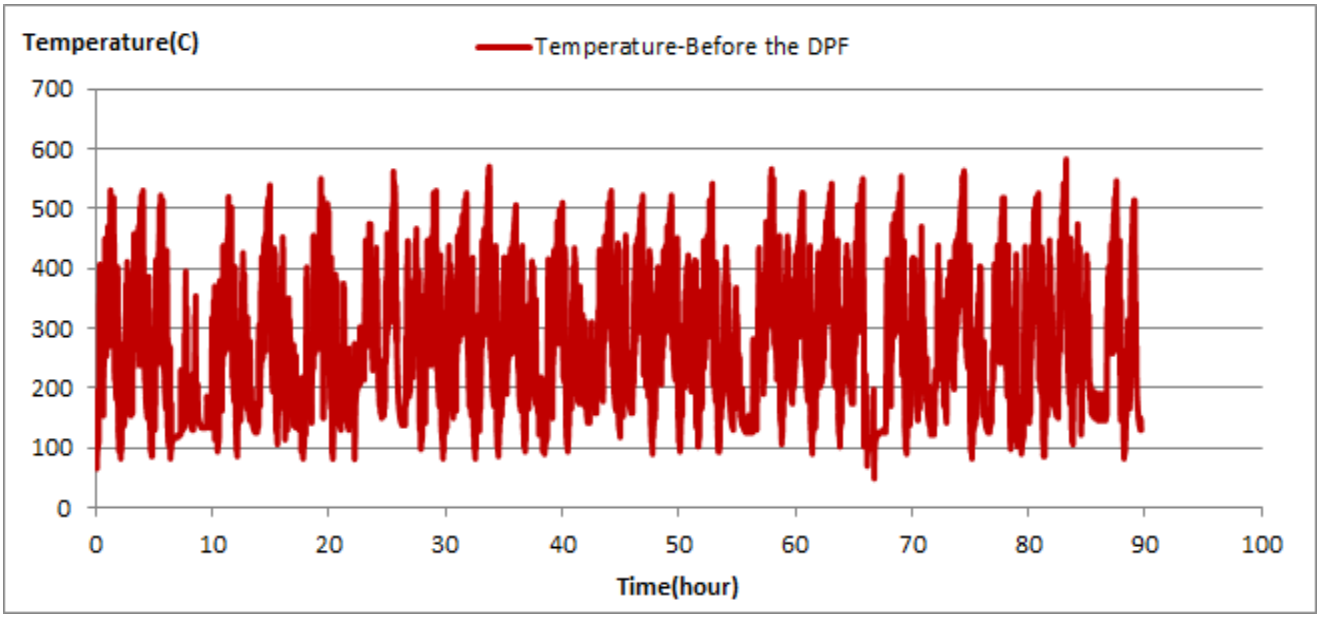


Figure 8- Before DPF temperature vs. working hours

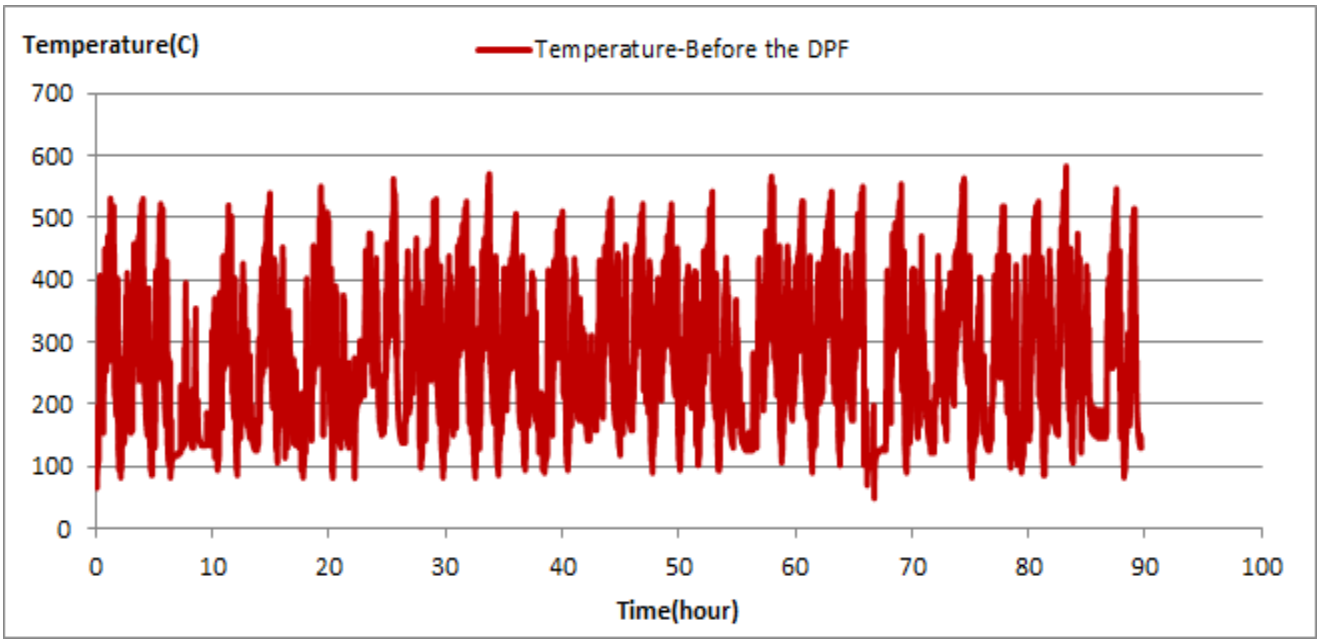


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

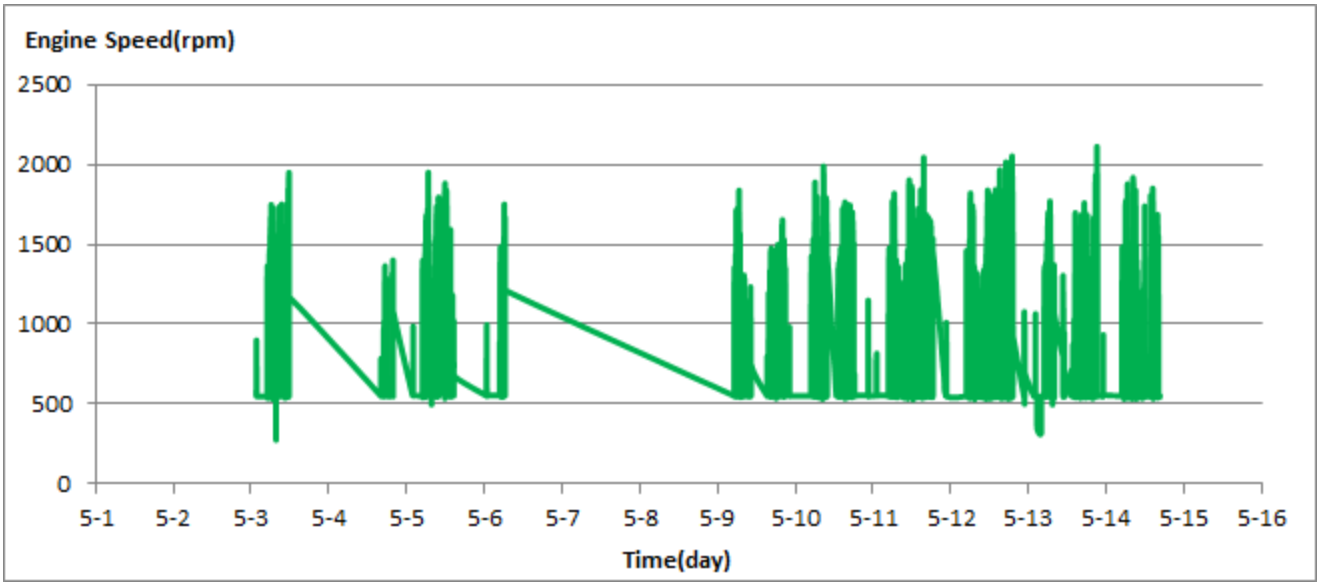


Figure 10- Engine speed distribution over fifteen days

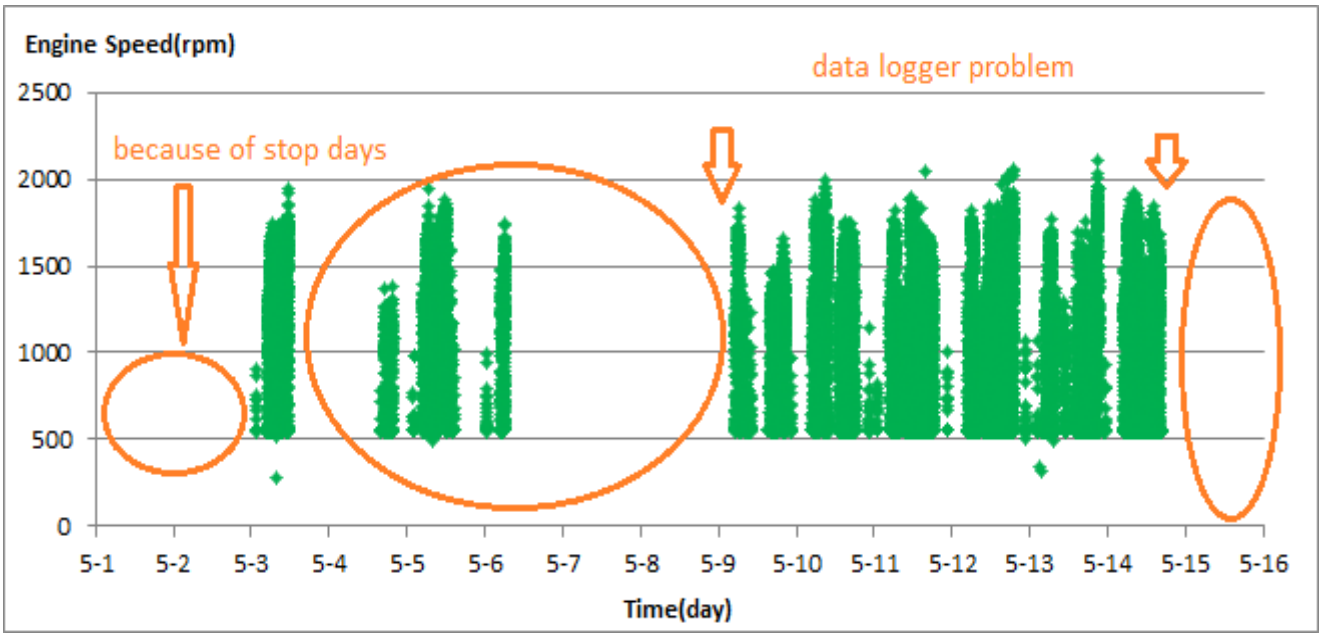


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

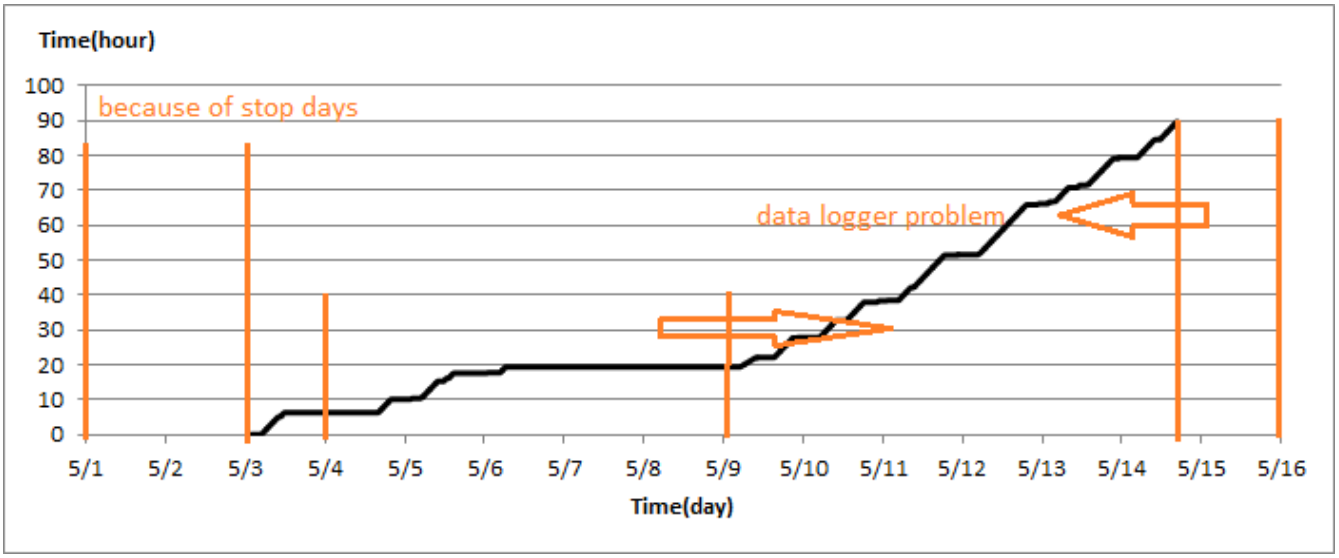


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with time (day) axis show days without data logger data. As shown in this picture data logger didn't sample for more than 50% of period's time. This high lack of data made results unreliable.

Pressure-Engine Speed diagrams

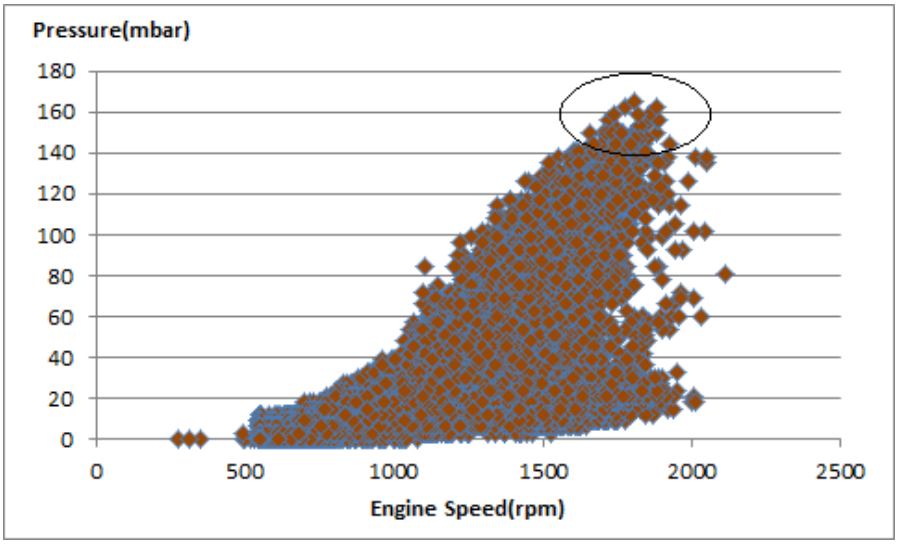


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

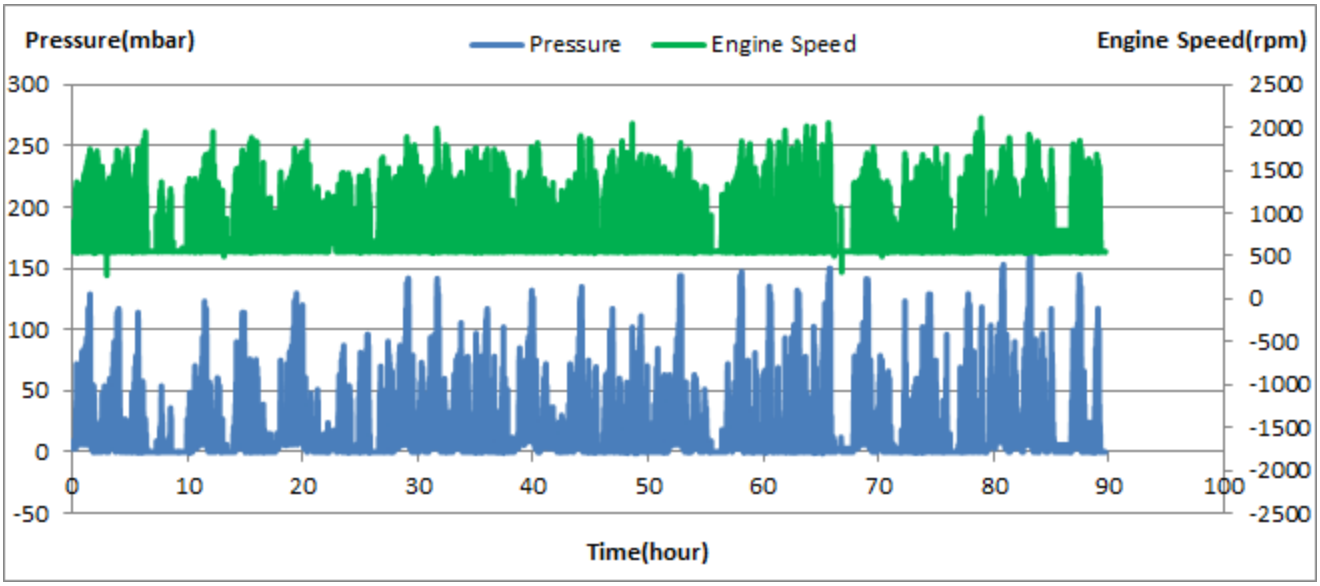


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

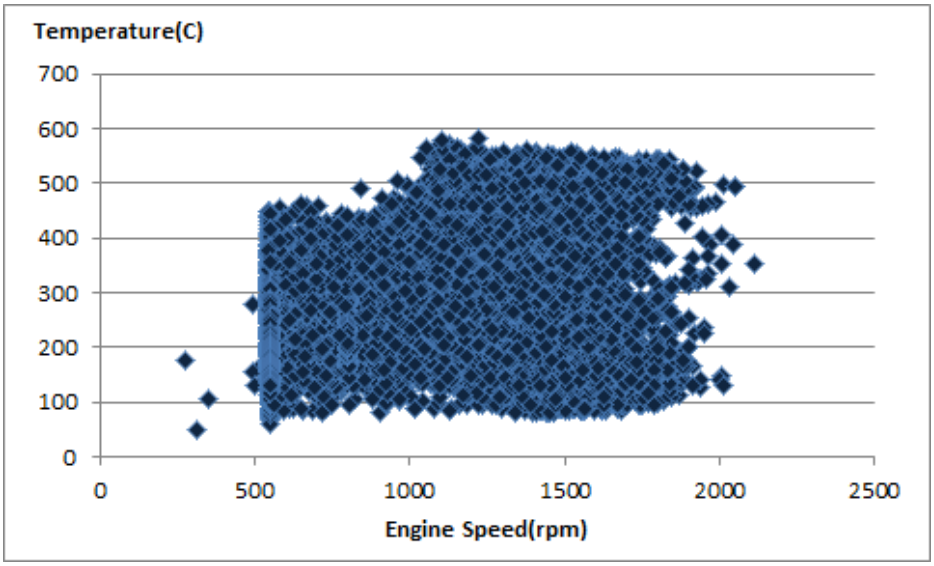


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

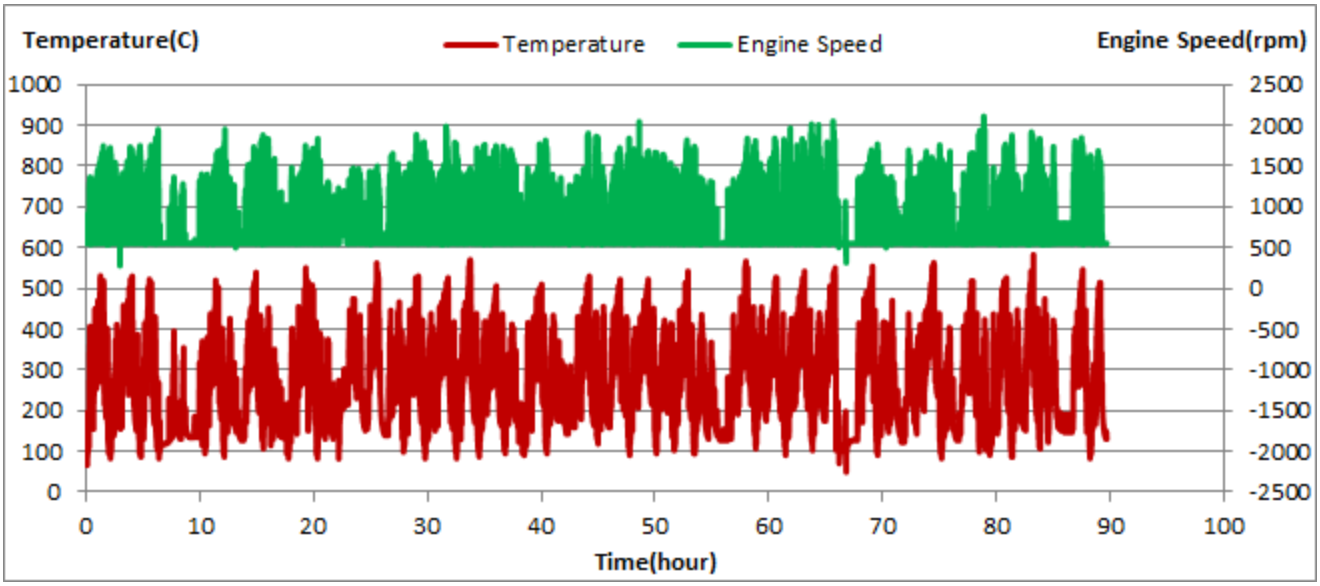


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- **During this period data logger of system had problem, because of high lack of data, results are unreliable.**

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

All right reserved by ASA company – confidential no passing to third parties.

Notice: During this period **data logger** of system had problem due to **bus electrical system**, so high lack of data was made results 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/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.60 $[m^{-1}]$
K value - DPF downstream	0.10 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	16749 km
Bus mileage over the period	2328 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	1893 lit
fuel consumption per hour	-
Average fuel consumption	0.81 lit/km
Total Bus additive consumption over the period	0.98 lit
Average additive consumption	0.422 cc/km
additive consumption to fuel ration	520 cc per 1000 lit (Batch Dosing with Tank Level)

Notice: because of **data logger problem** some information missed.

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

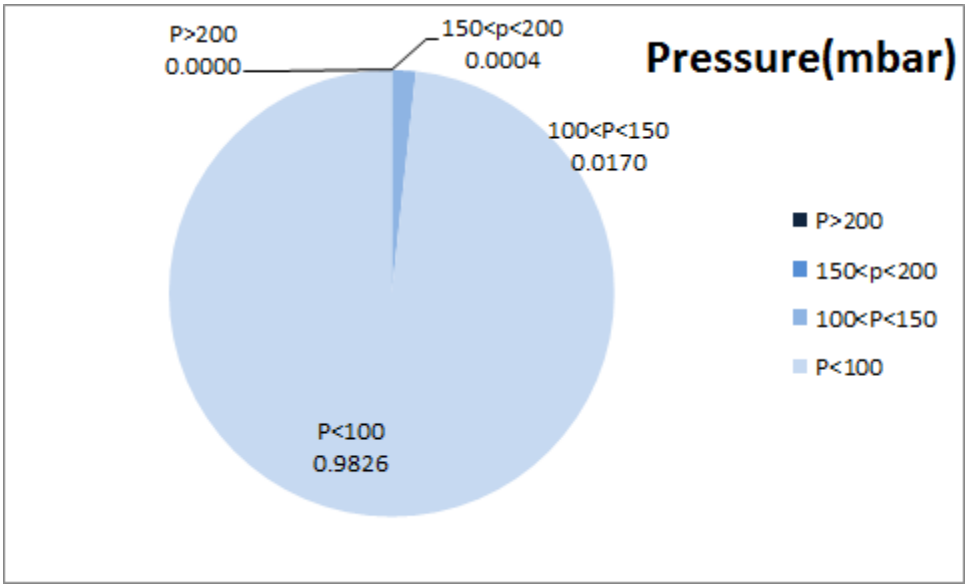


Figure 1- Pressure distribution over the working hours

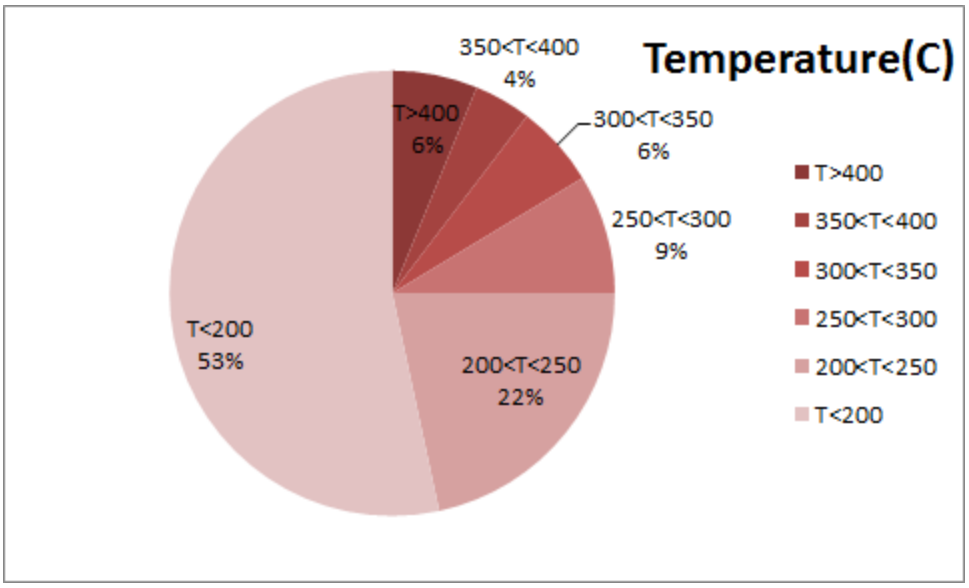


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

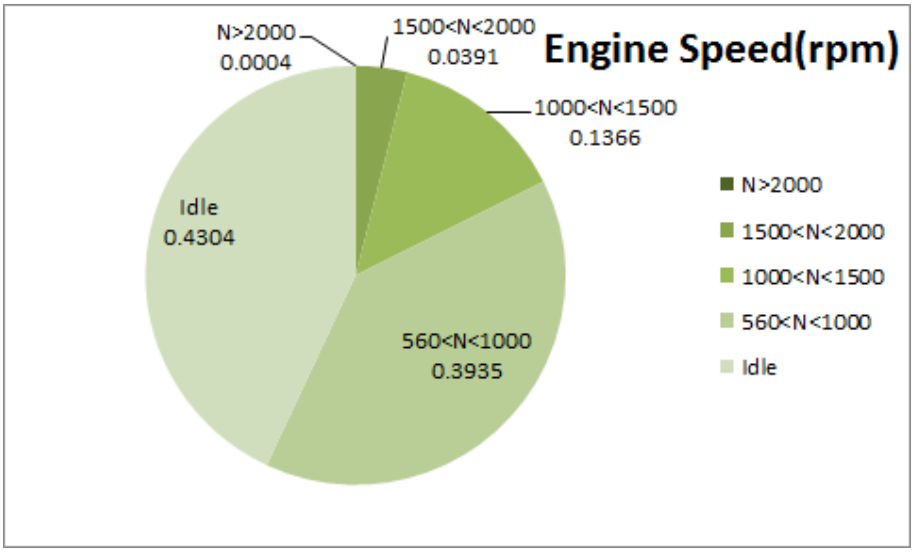


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
216.9	14.12	776

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
258	21.97	947

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
550-50	168-0	2140-299

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

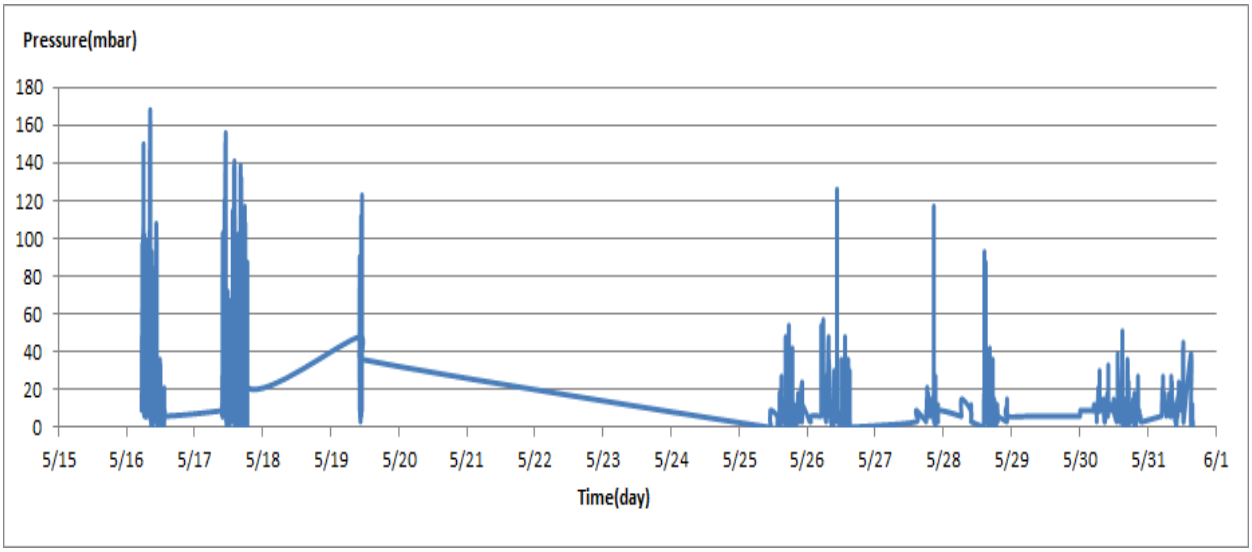


Figure 4- Pressure distribution over sixteen days

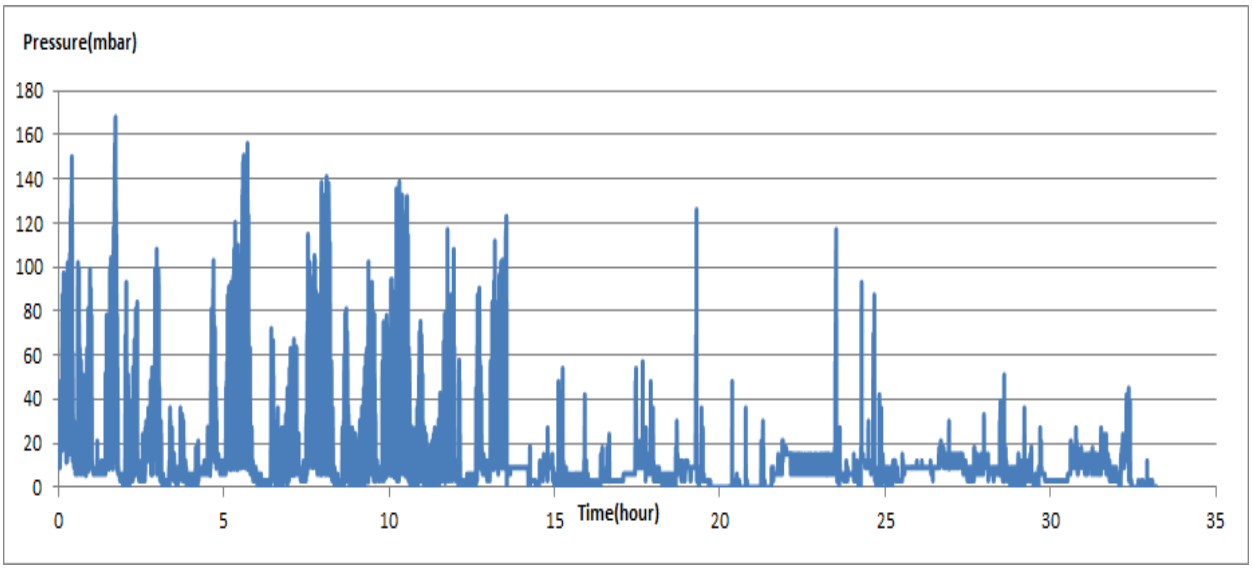


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

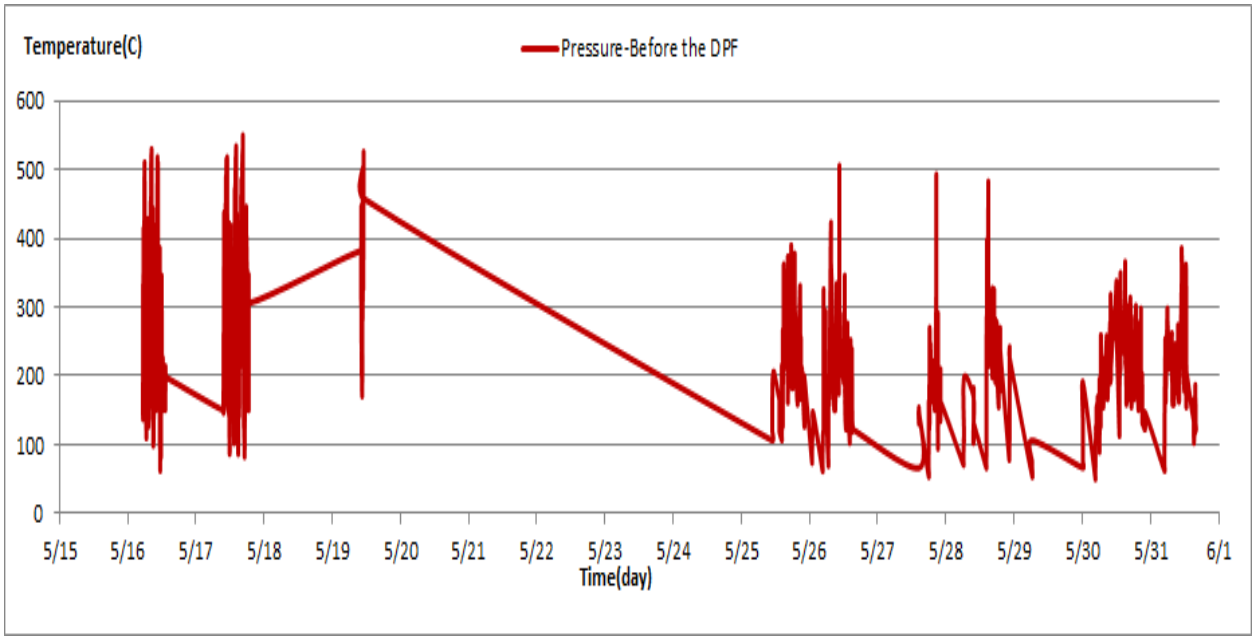


Figure 6- Temperature distribution over sixteen days

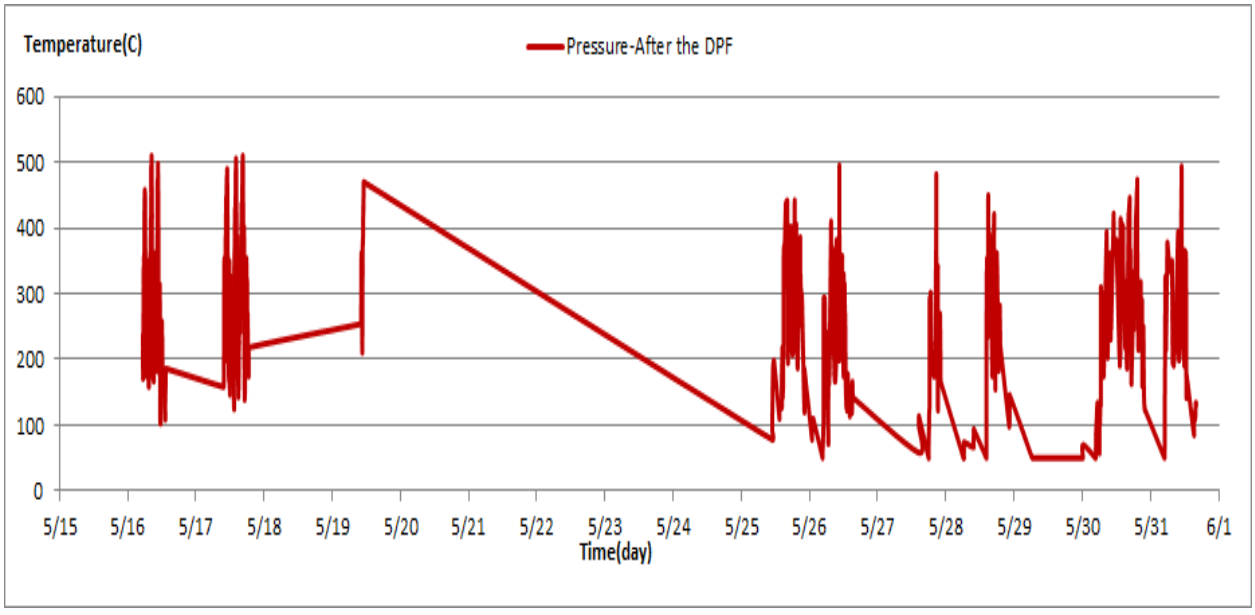


Figure 7- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

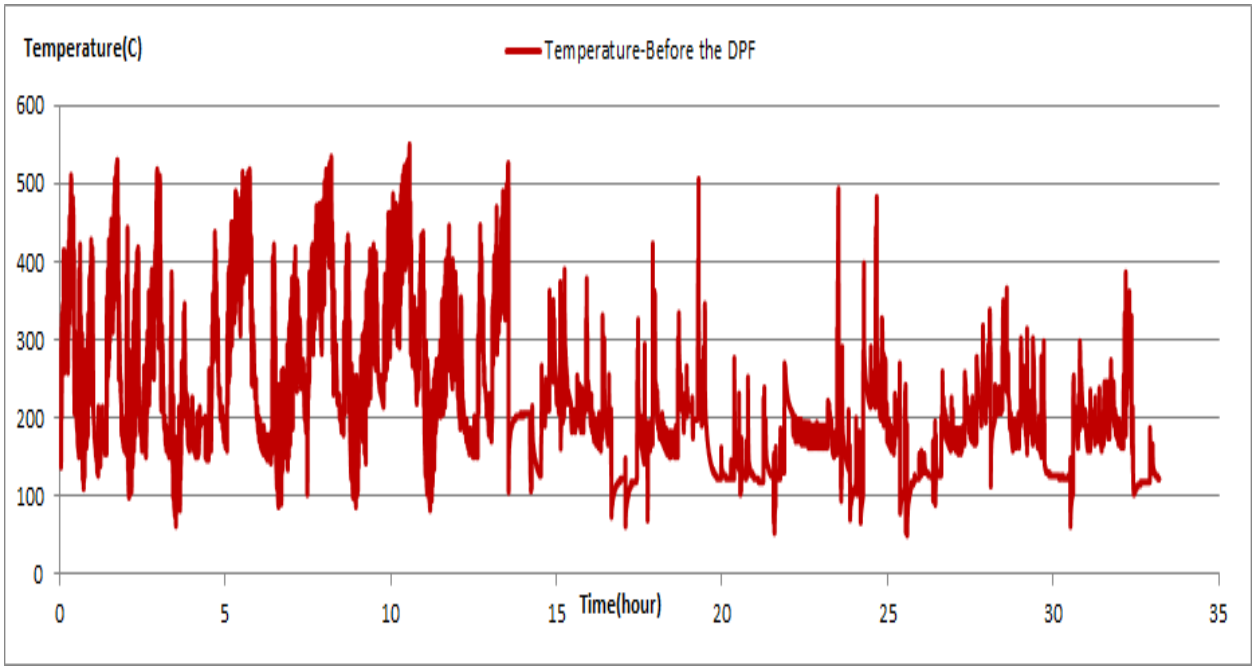


Figure 8- Before DPF temperature vs. working hours

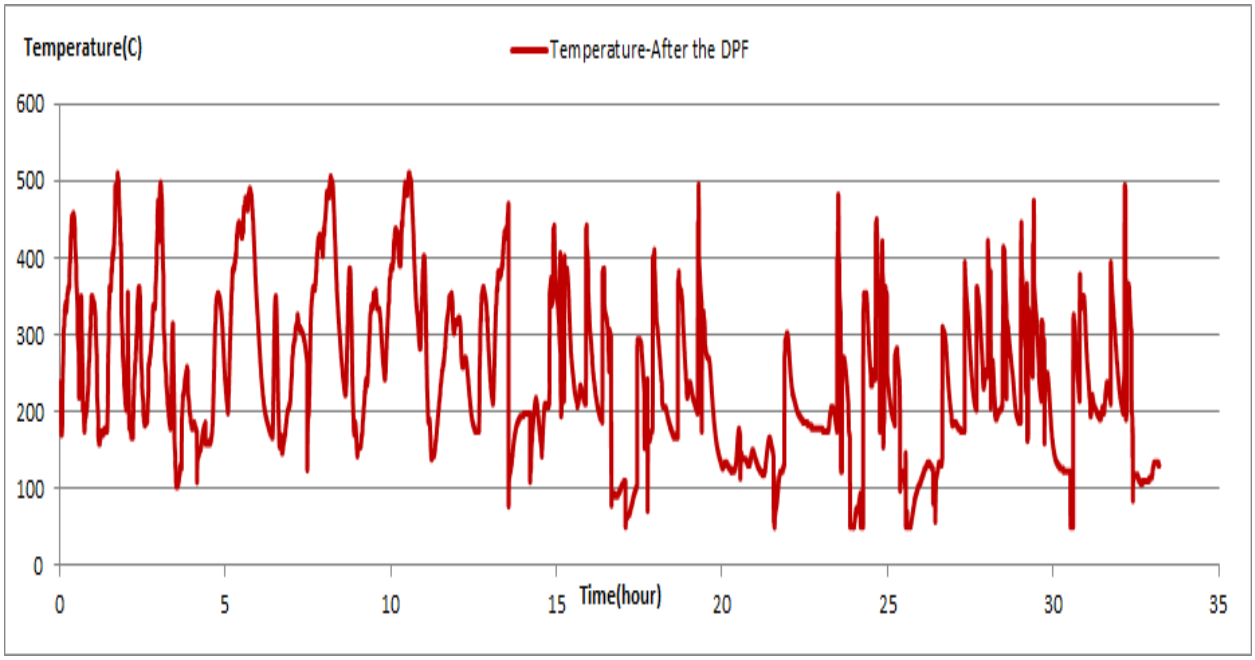


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

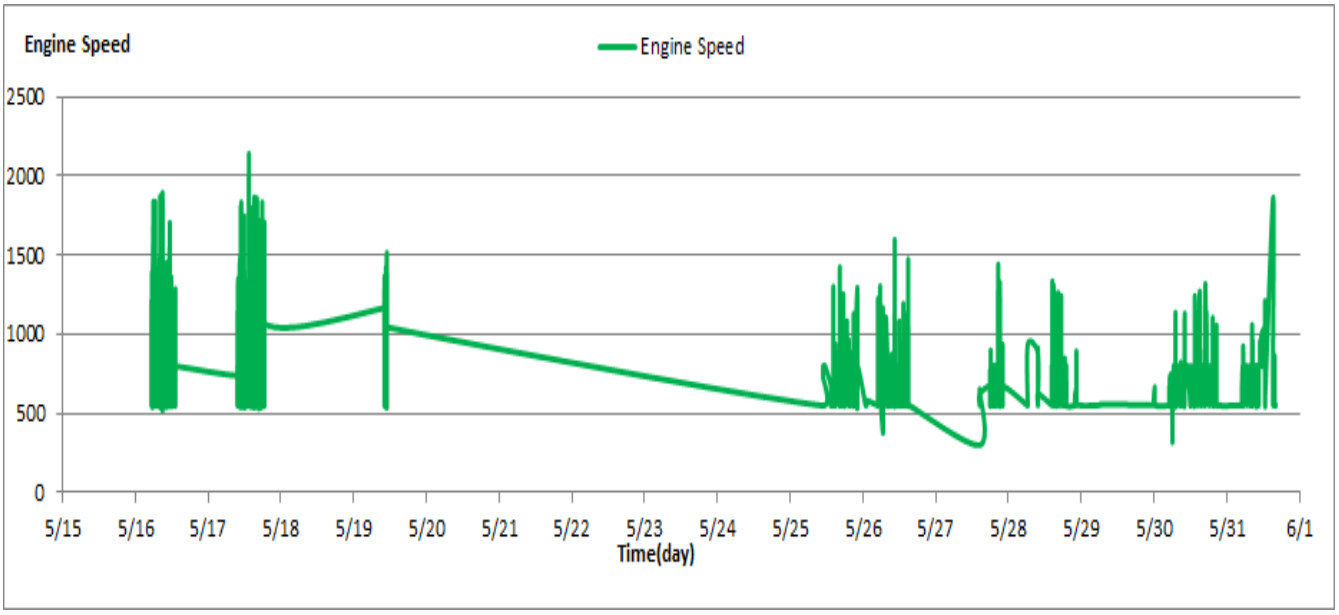


Figure 10- Engine speed distribution over sixteen days

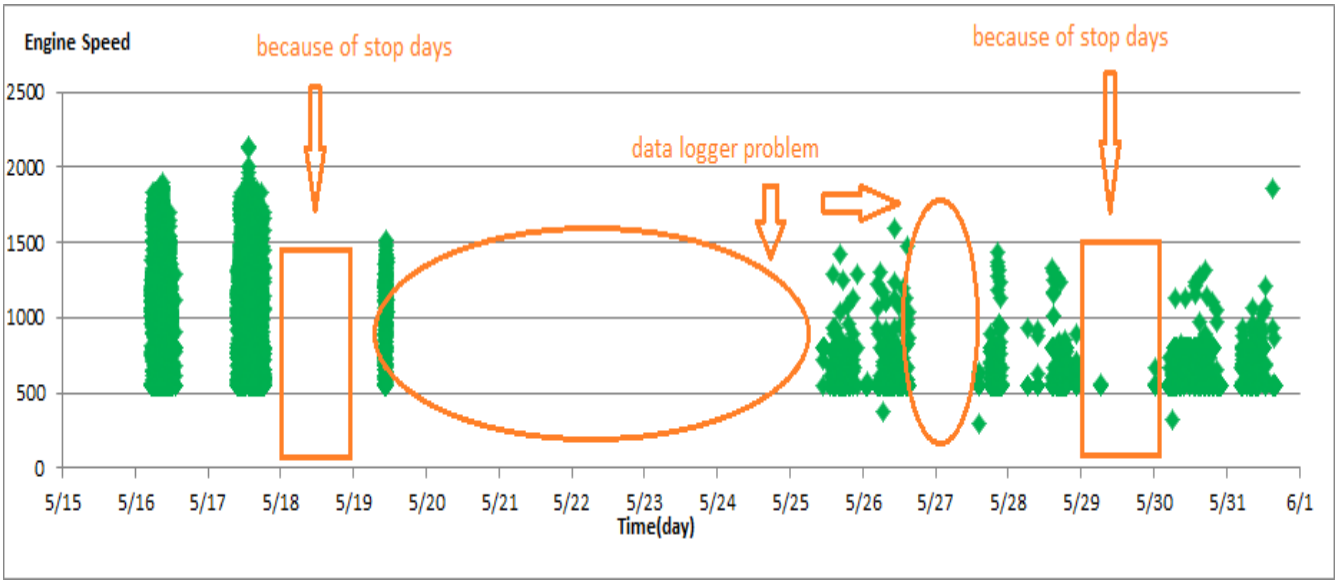


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

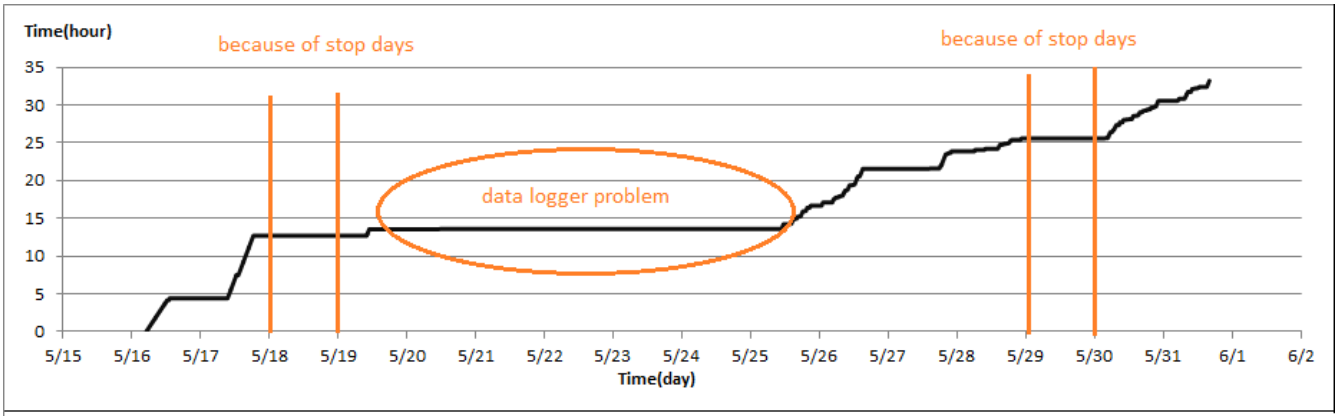


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with time (day) axis show days without data logger data. As shown in this picture data logger didn't sample 50% of period's time. This high lack of data made results unreliable.

Pressure-Engine Speed diagrams

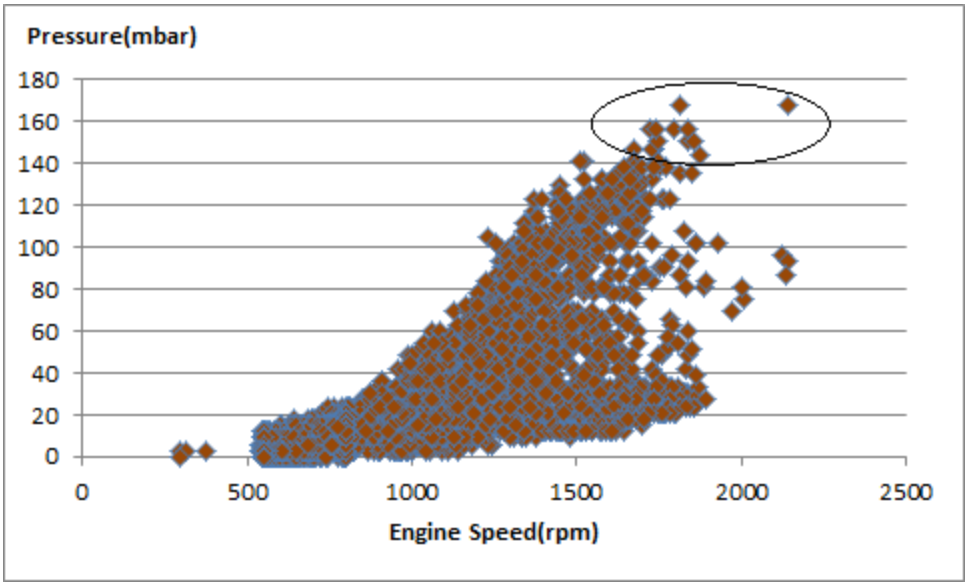


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

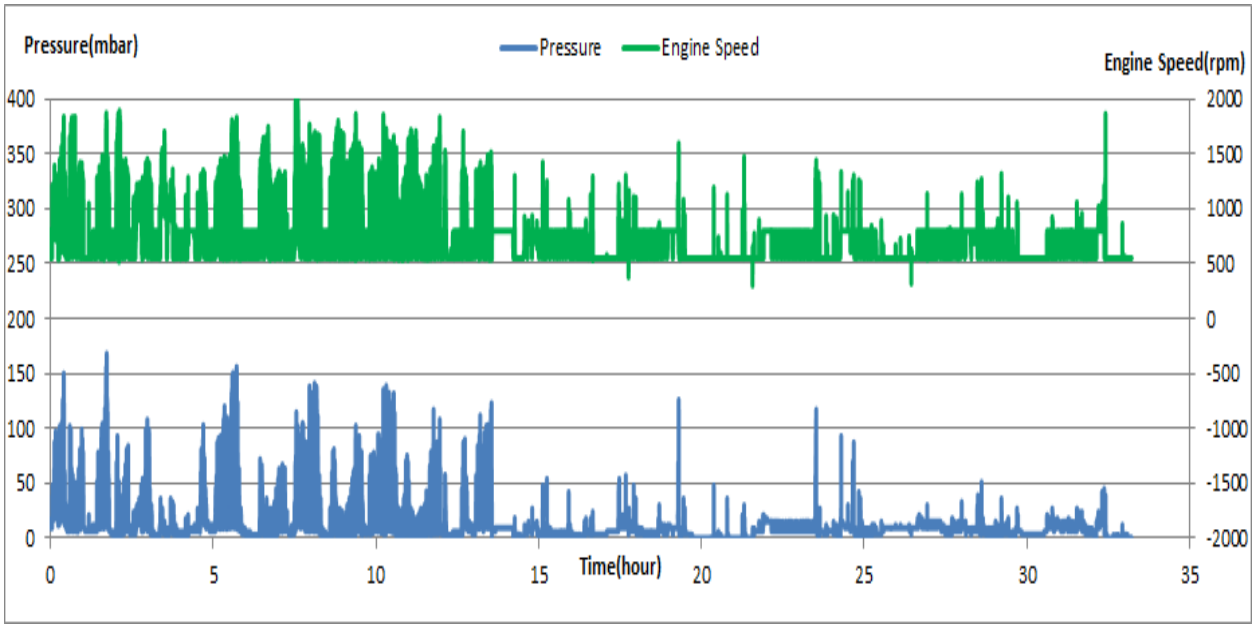


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

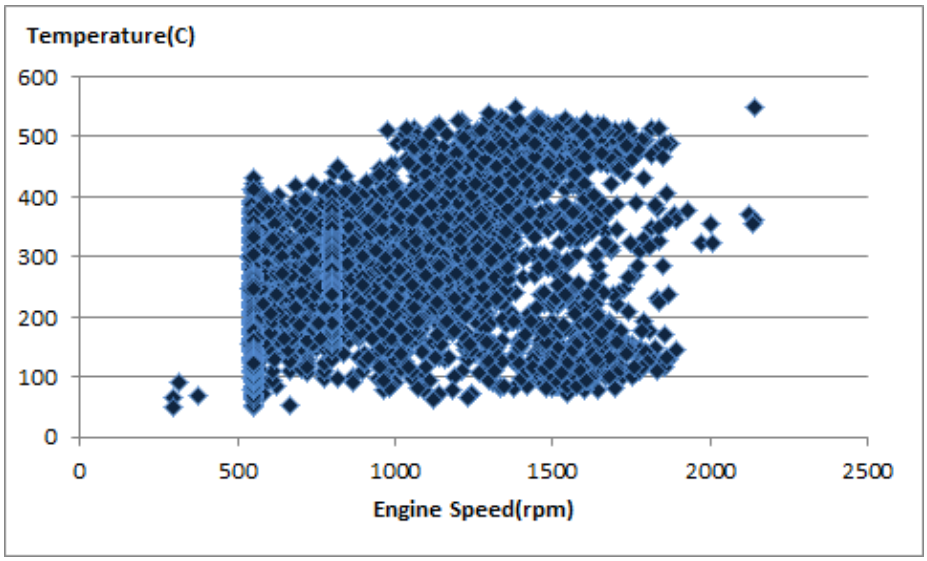


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

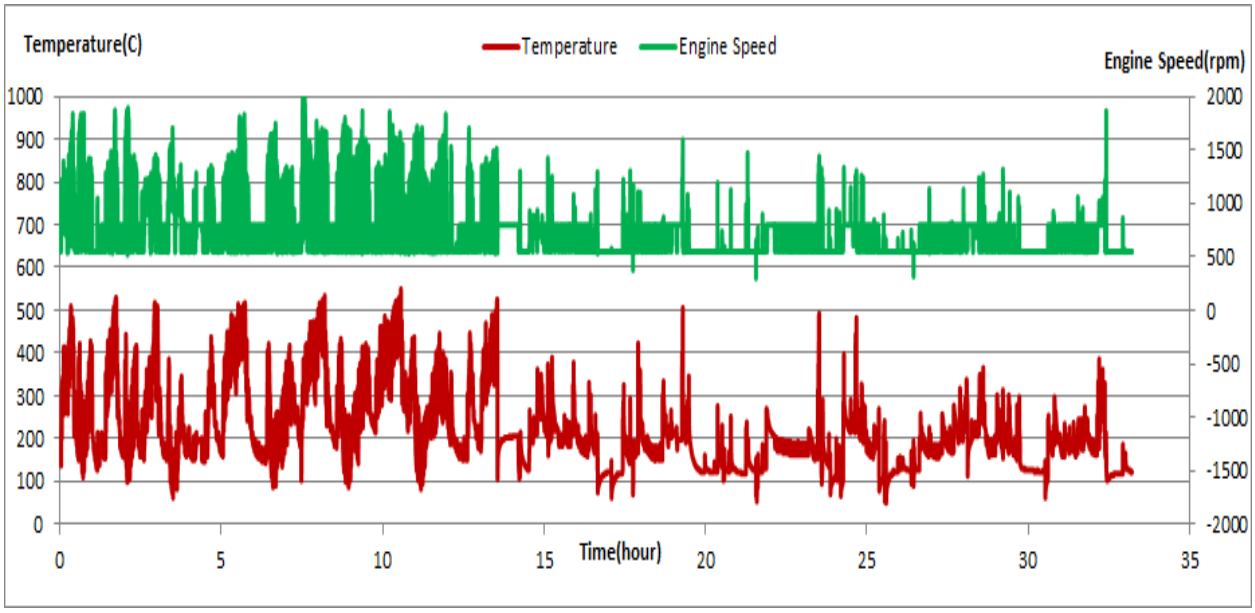


Figure 16- T, N distribution vs. working hours

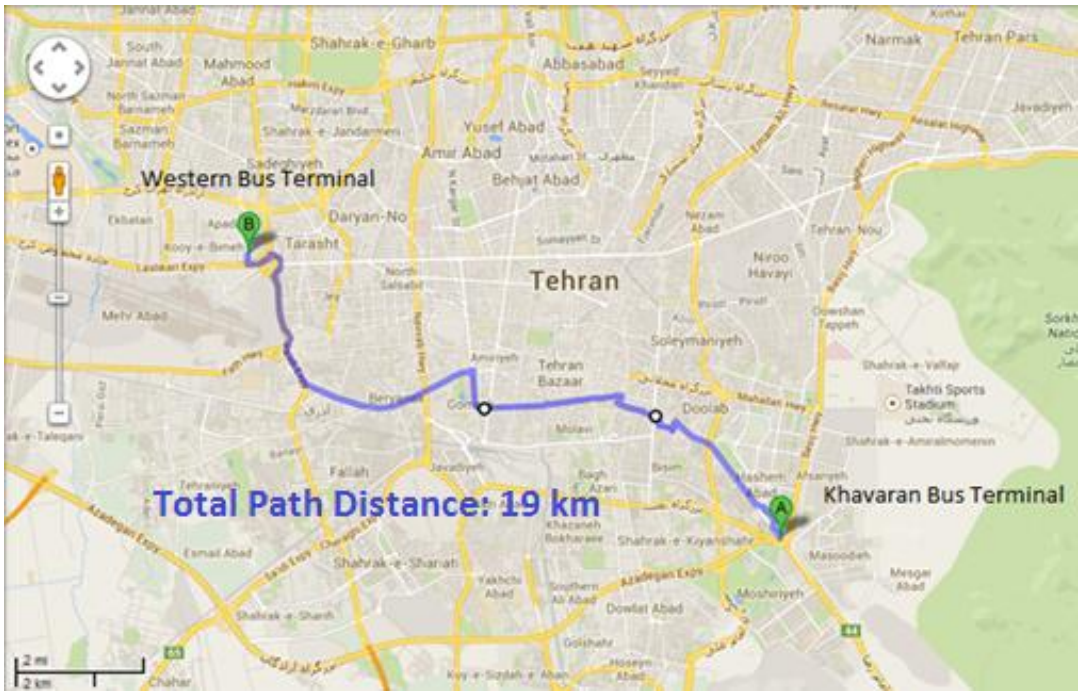
Filter Operation Analysis

- **During this period data logger of system had problem, because of high lack of data, results are unreliable.**

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

All right reserved by ASA company – confidential no passing to third parties.

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)



All right reserved by ASA company – confidential no passing to third parties.

Overall Information

Table1- Overall Information

Vehicle plate number	33572
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/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.53 $[m^{-1}]$
K value – DPF downstream	0.10 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	11571 km
Bus mileage over the period	2500 km
Working days over the period	15 days
Stop days	0 day
Data logger working days	14 days
Working hours over the period	195.86+(1*14)=209.9 hours
Average working hours per a day (including stop days)	14
Bus average speed	12.76 km/hr
idle speed time to all working time ration	55%
Total Bus fuel consumption over the period	1359 lit
fuel consumption per hour	6.47 lit/hr
Average fuel consumption	0.54 lit/km
Total Bus additive consumption over the period	0.57 lit
Average additive consumption	0.228 cc/km
additive consumption to fuel ration	419 cc per 1000 lit (Batch Dosing with Tank Level)

Notice: As depicted in Figure 12, data logger didn't work on May 15th. So we add average working hours to calculated working hours from the data logger.

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

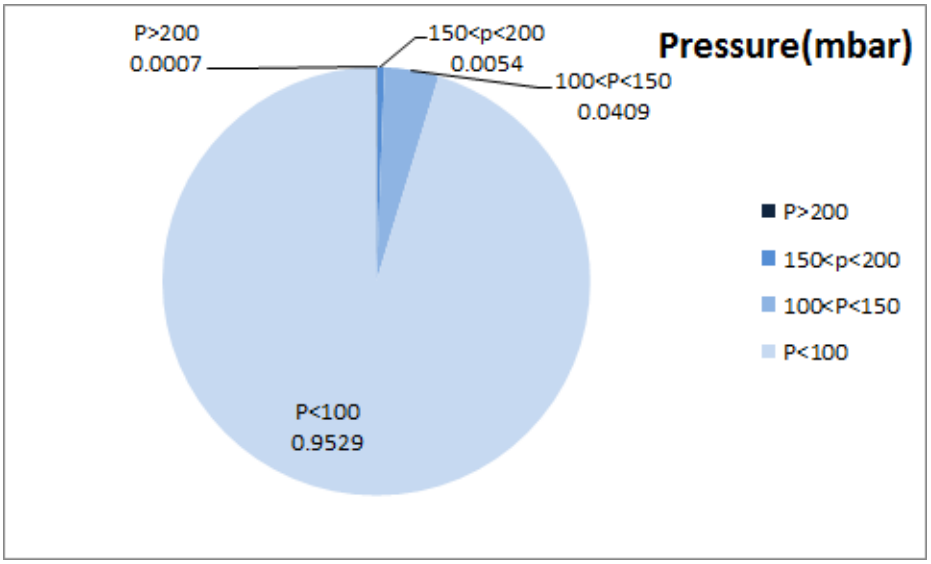


Figure 1- Pressure distribution over the working hours

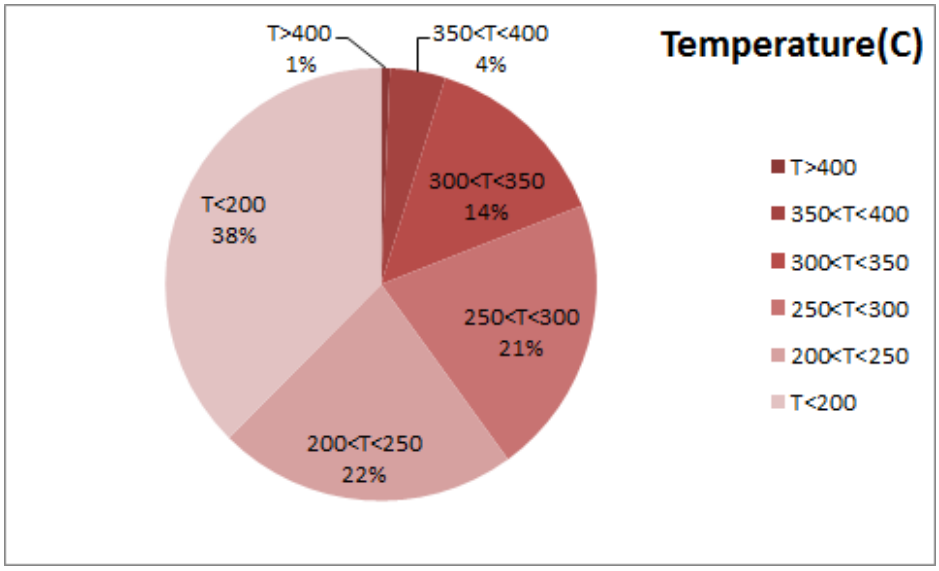


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

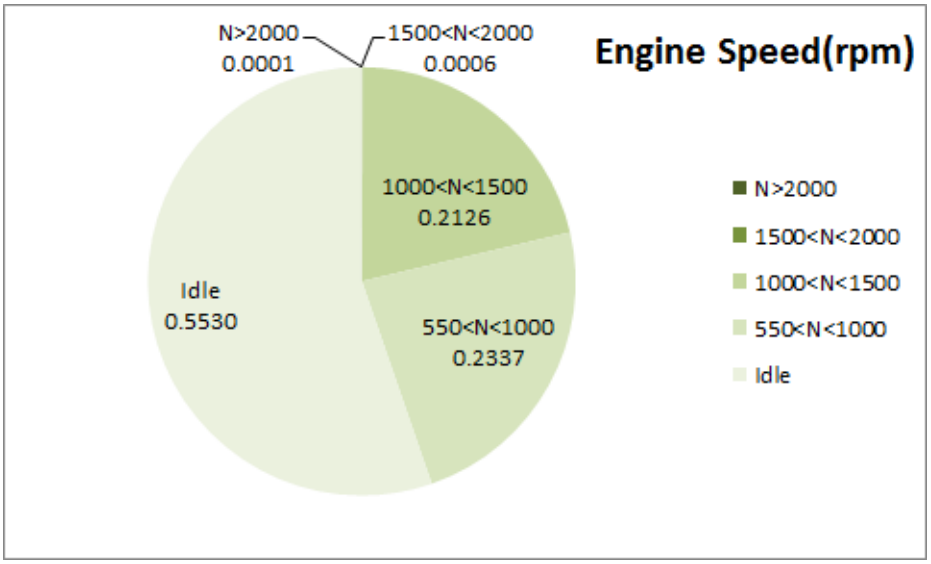


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
229.59	31.56	724

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
287.38	54.38	947

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
482-50	282-0	4000-256

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

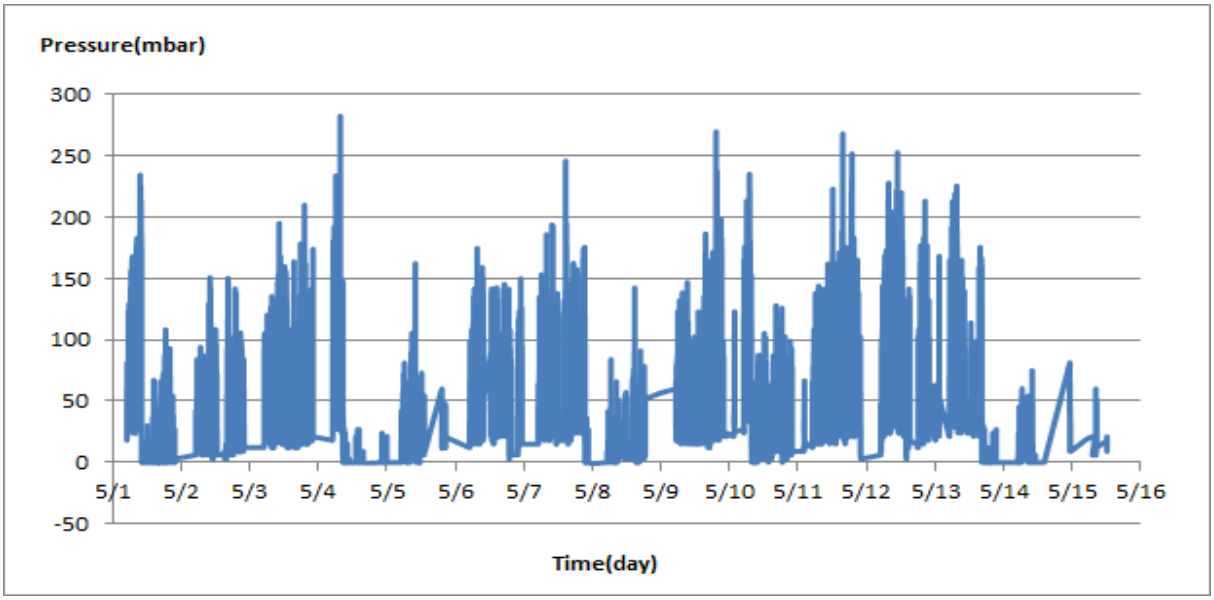


Figure 4- Pressure distribution over fifteen days

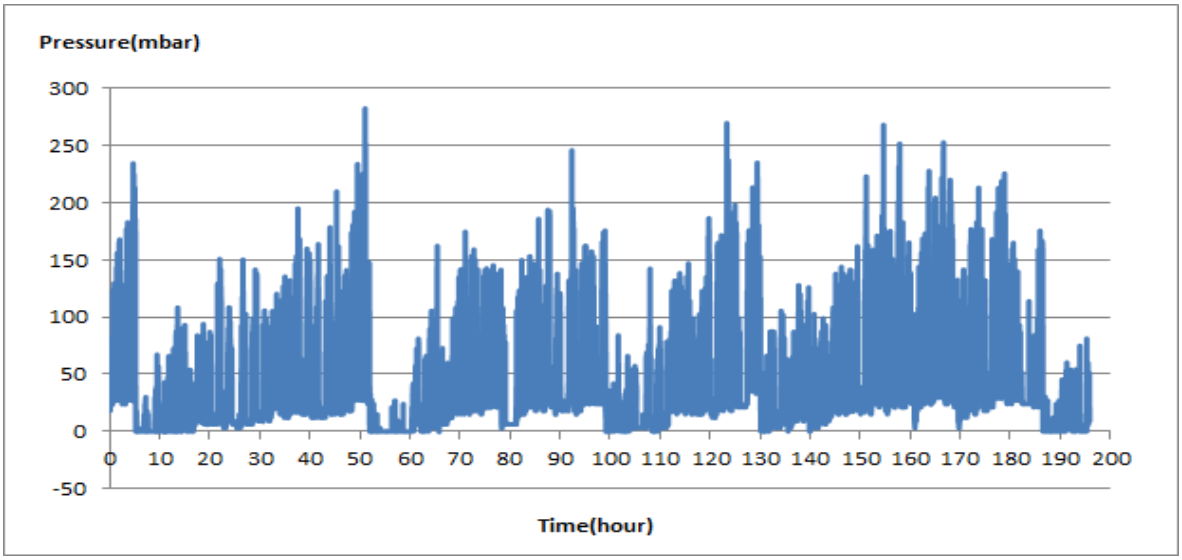


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

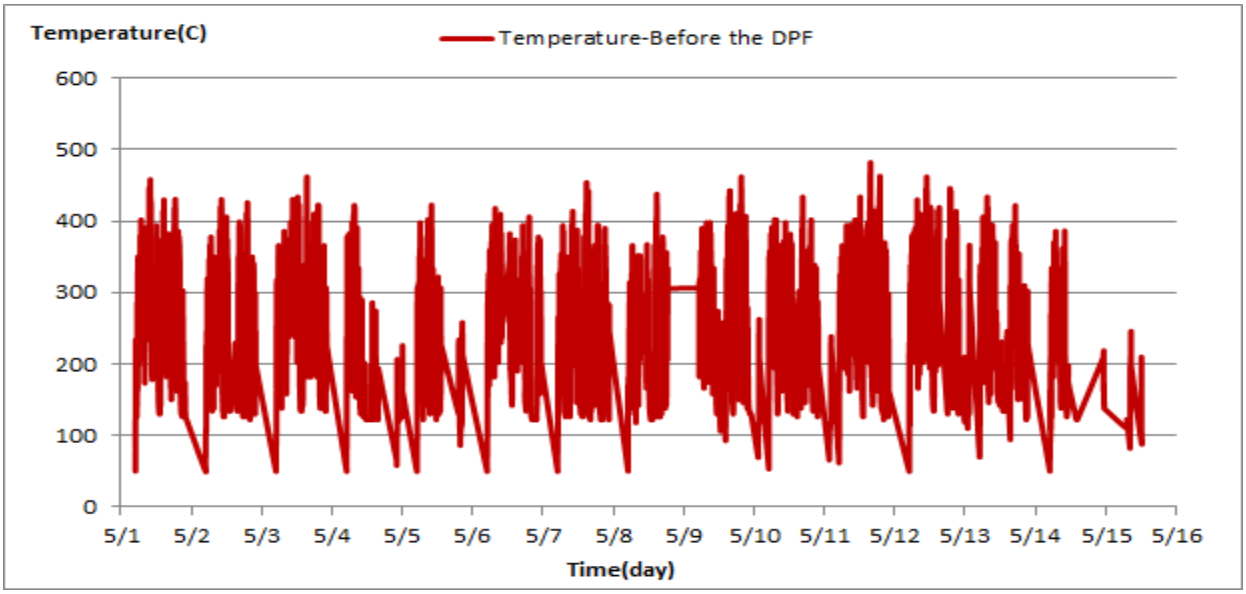


Figure 6- Temperature distribution over fifteen days

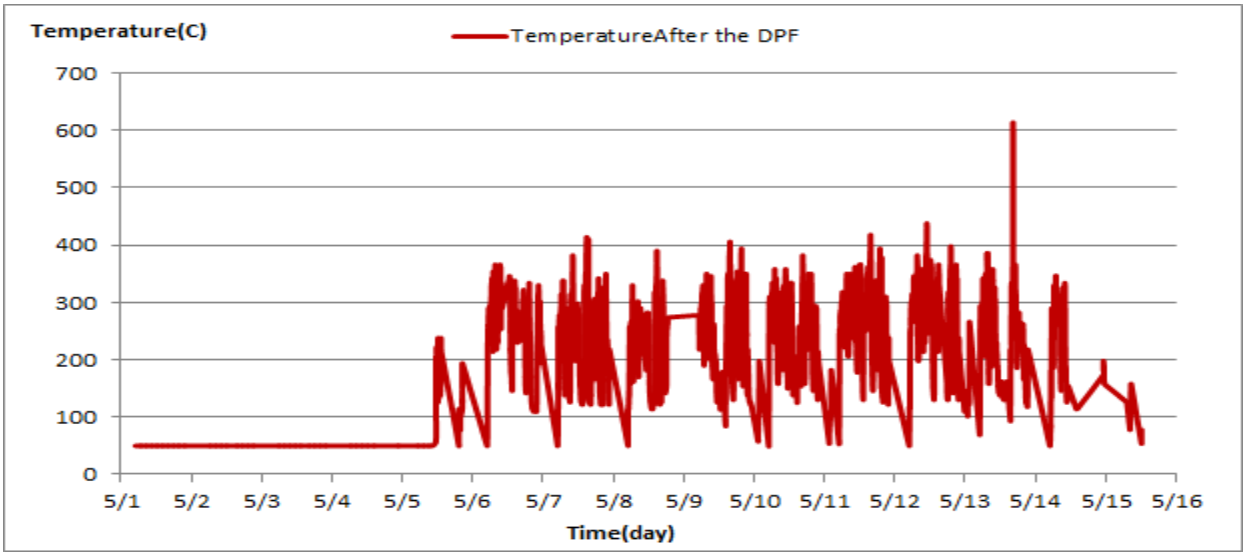


Figure 7- Temperature distribution over fifteen days

Notice: Temperature sensor for after the DPF installed on May 5th, so before this date CPK's showed 50°C.

All right reserved by ASA company – confidential no passing to third parties.

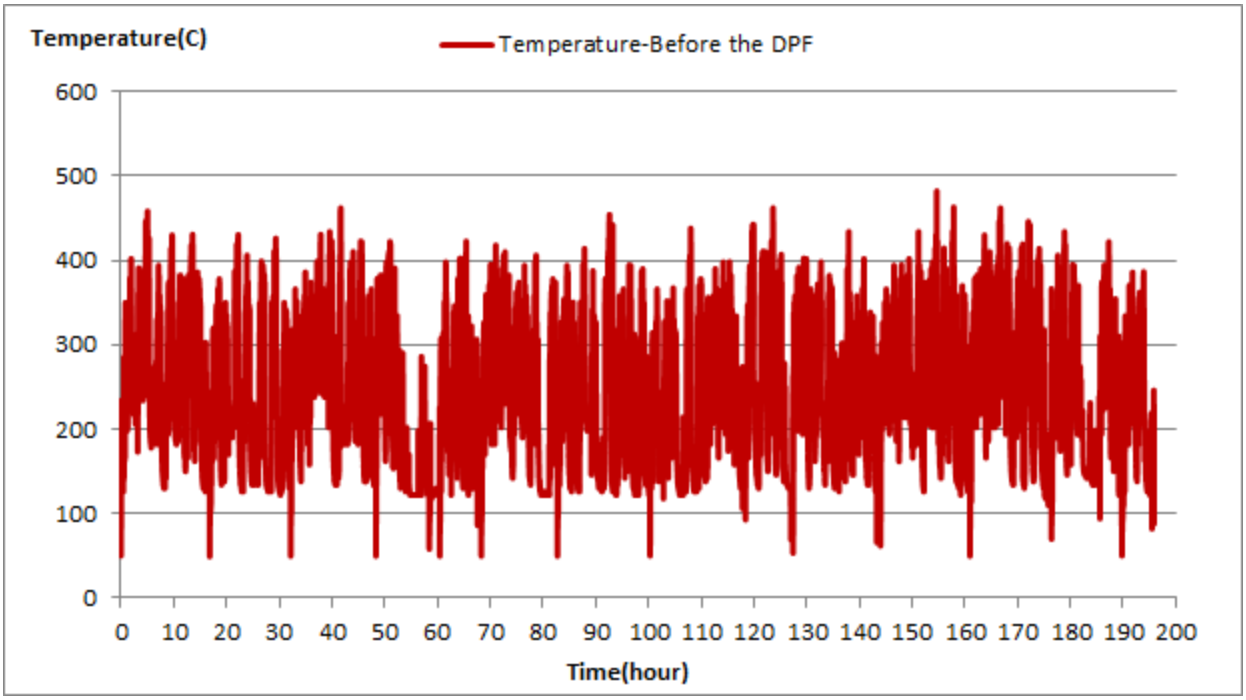


Figure 8- Before DPF temperature vs. working hours

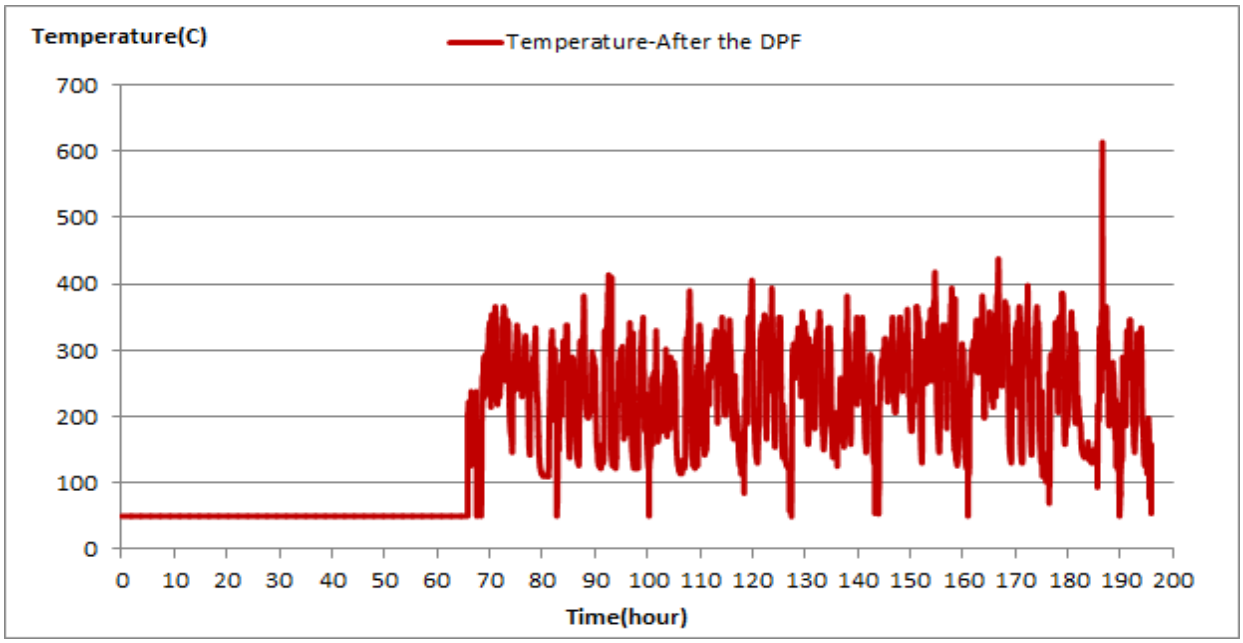


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

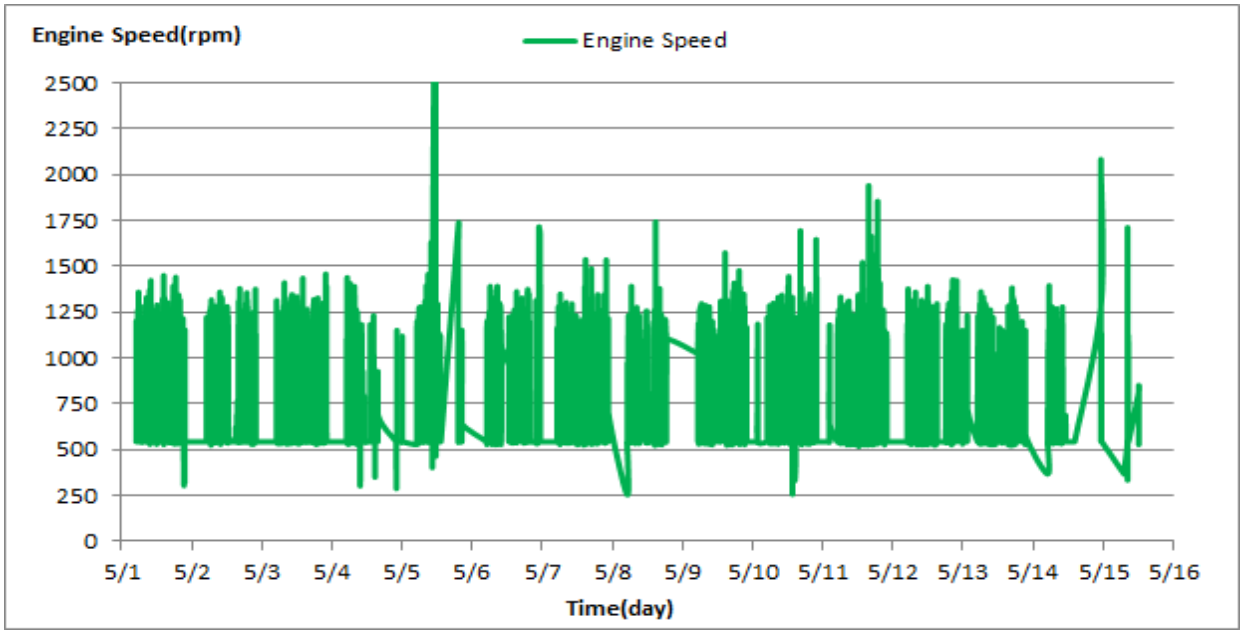


Figure 10- Engine speed distribution over fifteen days

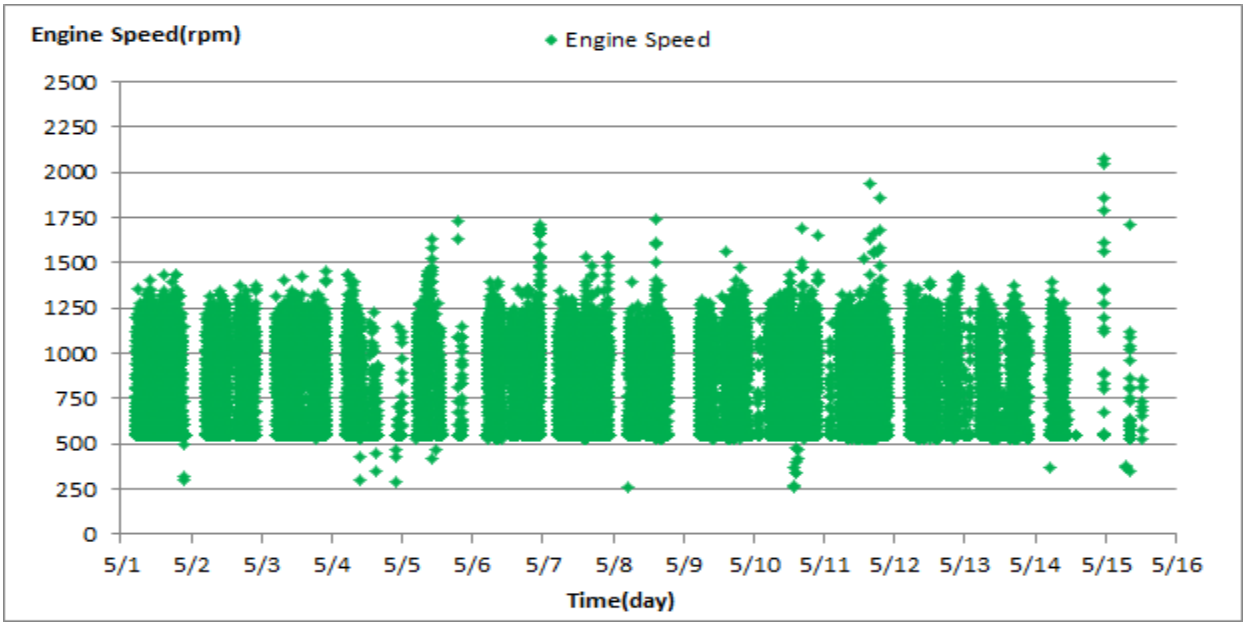


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

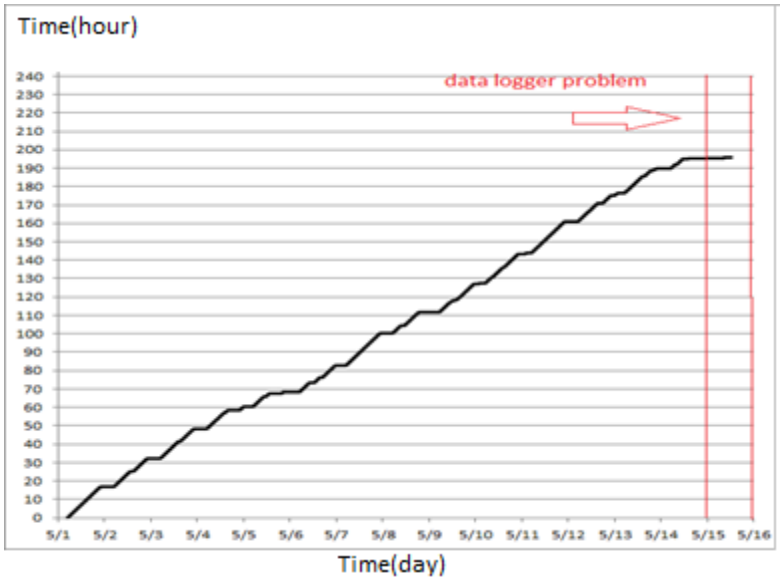


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with time (day) axis show days without data logger's (CPK) data. As depicted in Figure 12, data logger didn't sample on May 15th.

Pressure-Engine Speed diagrams

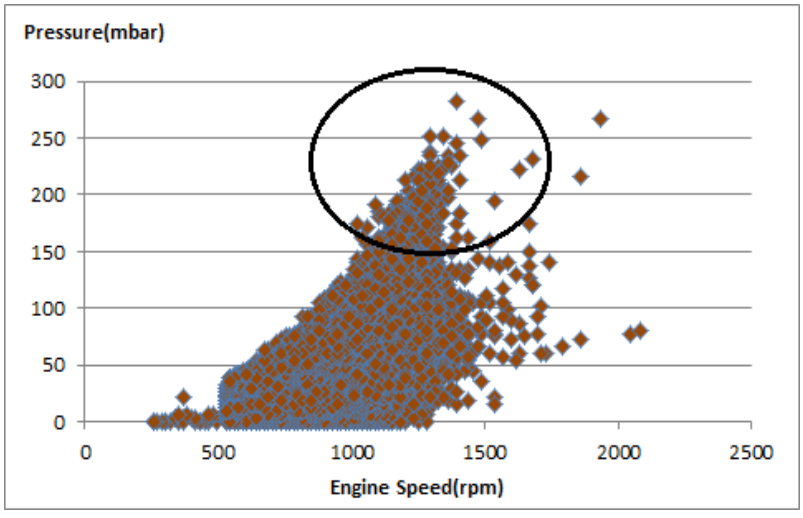


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

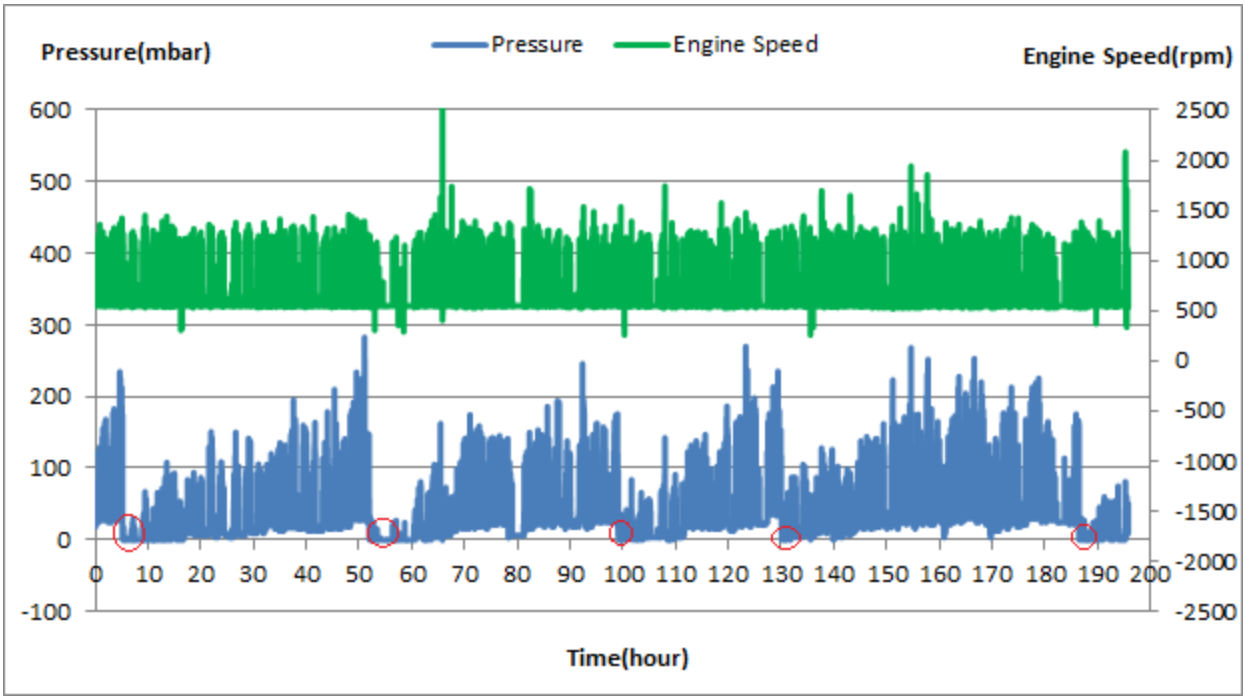


Figure 14- P,N distribution vs. working hours

Notice: The red circles show active regeneration times.

Temperature- Engine Speed Diagram

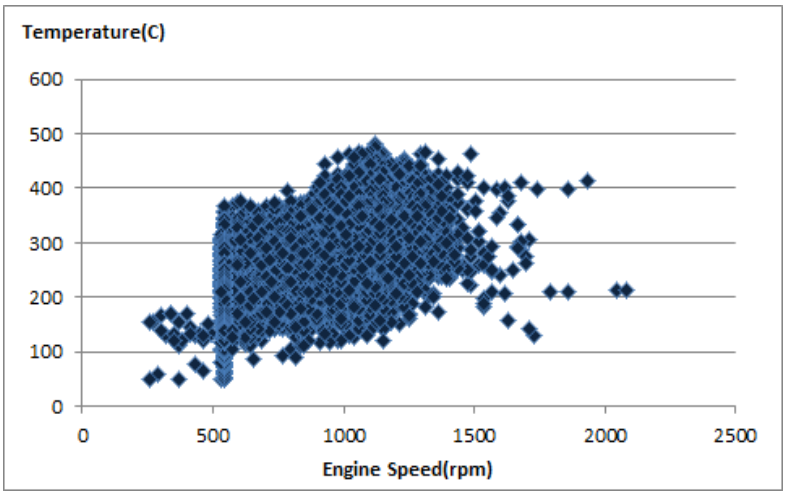


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

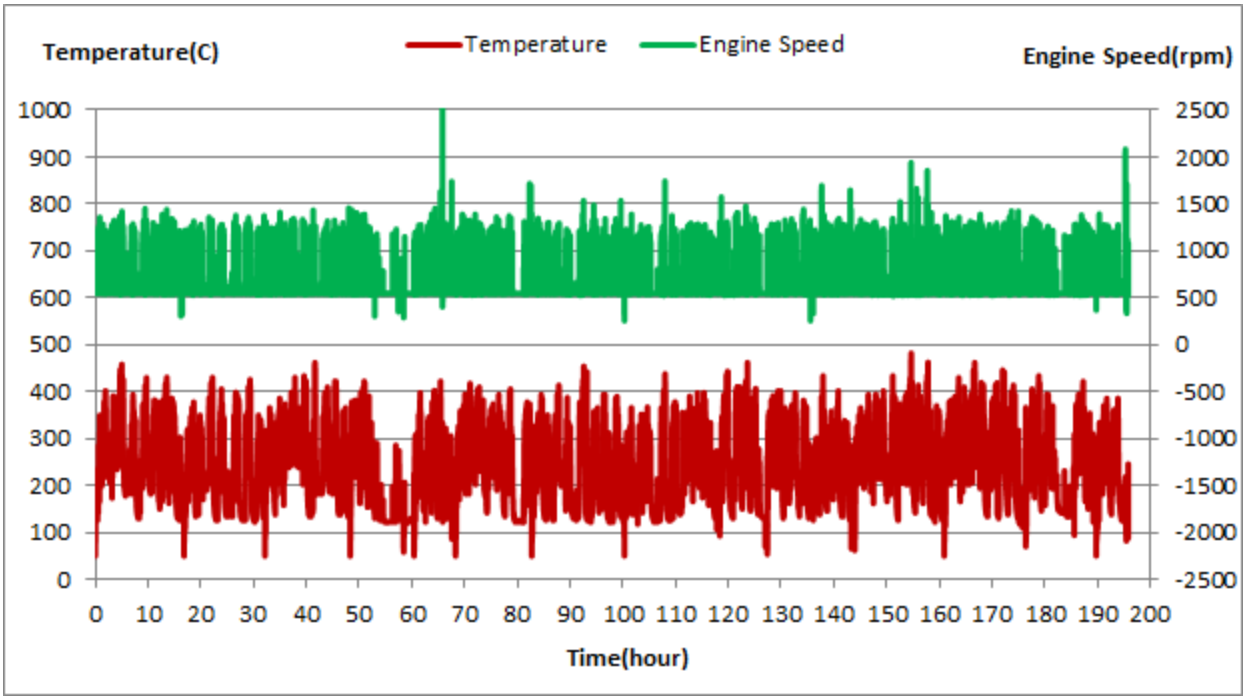


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.07% of total working-time pressure is above 200 mbar and 0.61% above 150mbar. So it can be concluded that operation of this filter is fully acceptable in this condition.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that only 1 % of total working-time temperature is above 400°C.
- This vehicle operates in line 2 and for its path characteristic, engine operates in low speed. It's worth-mentioning this low engine speed distribution causes low temperature distribution.

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

All right reserved by ASA company – confidential no passing to third parties.

Overall Information

Table1- Overall Information

Vehicle plate number	33572
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/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.53 $[m^{-1}]$
K value - DPF downstream	0.10 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	14280 km
Bus mileage over the period	2709 km
Working days over the period	16 days
Stop days	0 day
Data logger working days	16 days
Working hours over the period	238.8 hours
Average working hours per a day (including stop days)	14.93 hours
Bus average speed	11.34 km/hr
idle speed time to all working time ration	51%
Total Bus fuel consumption over the period	1572 lit
fuel consumption per hour	6.58 lit/hr
Average fuel consumption	0.58 lit/km
Total Bus additive consumption over the period	0.65 lit
Average additive consumption	0.241 cc/km
Additive consumption to fuel ration	415 cc per 1000 lit (Batch Dosing with Tank Level)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

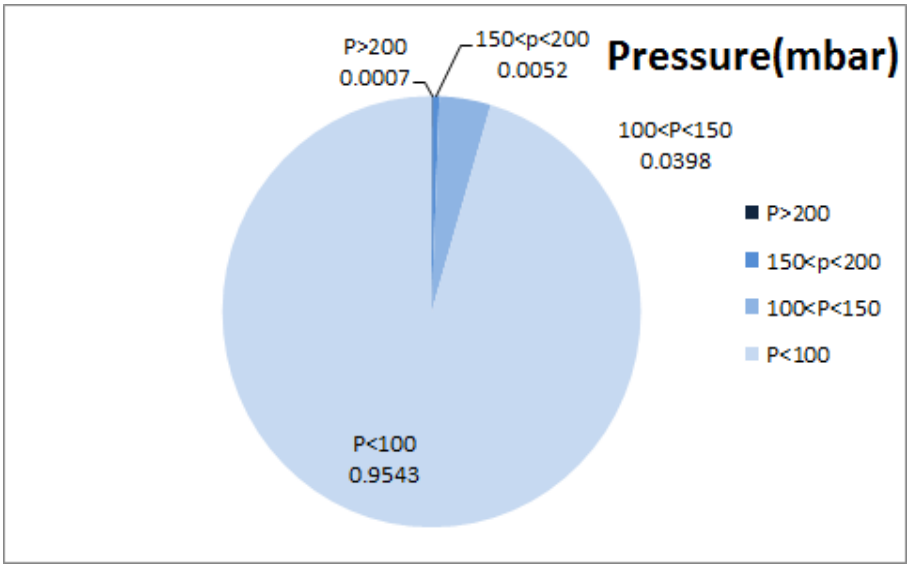


Figure 1- Pressure distribution over the working hours

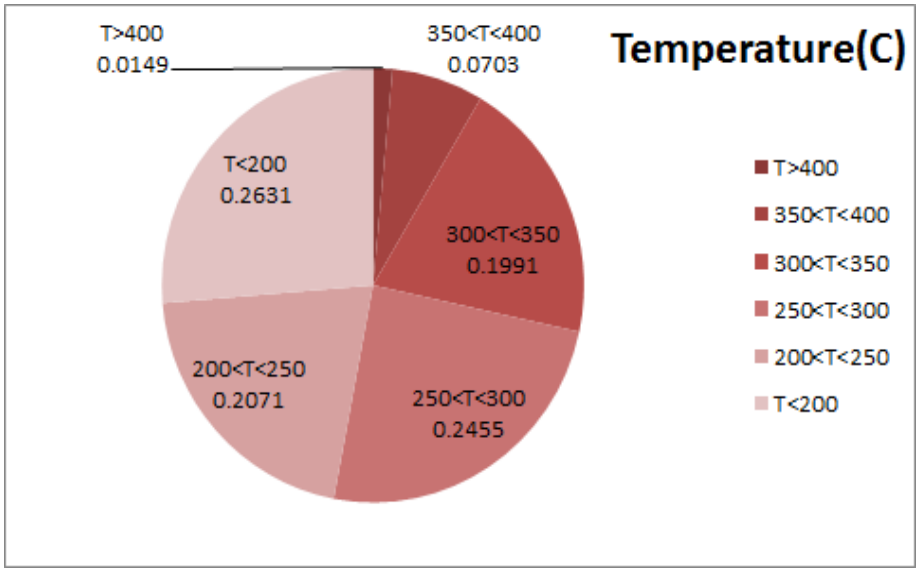


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

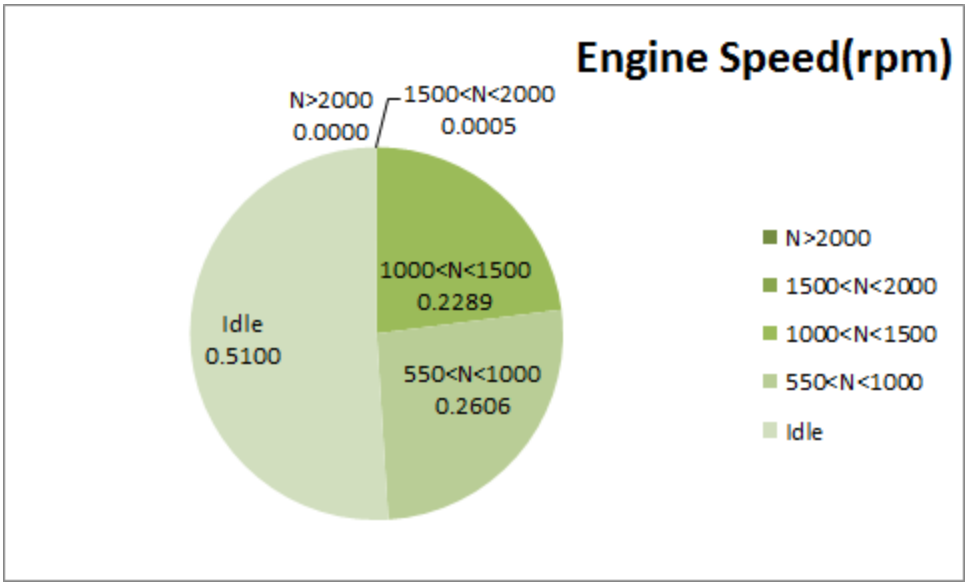


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
254.84	32.55	739

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
303.57	52.38	944

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

502-50	267-0	1984-256

Detailed Pressure Analysis

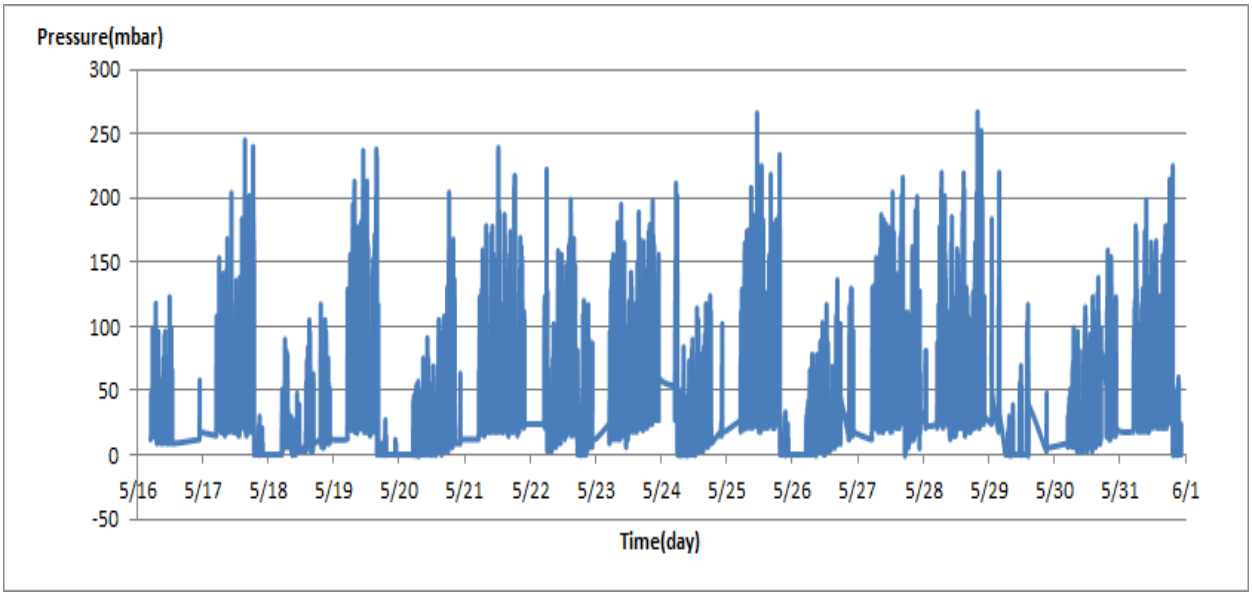


Figure 4- Pressure distribution over sixteen days

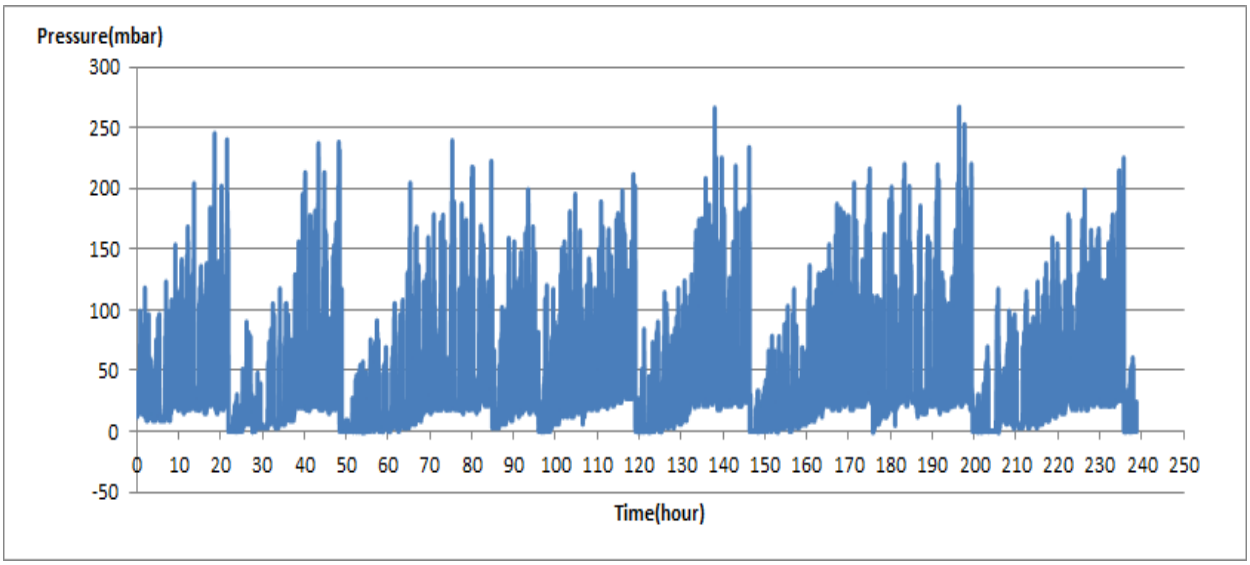


Figure 5- Pressure vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

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

Detailed Temperature Analysis

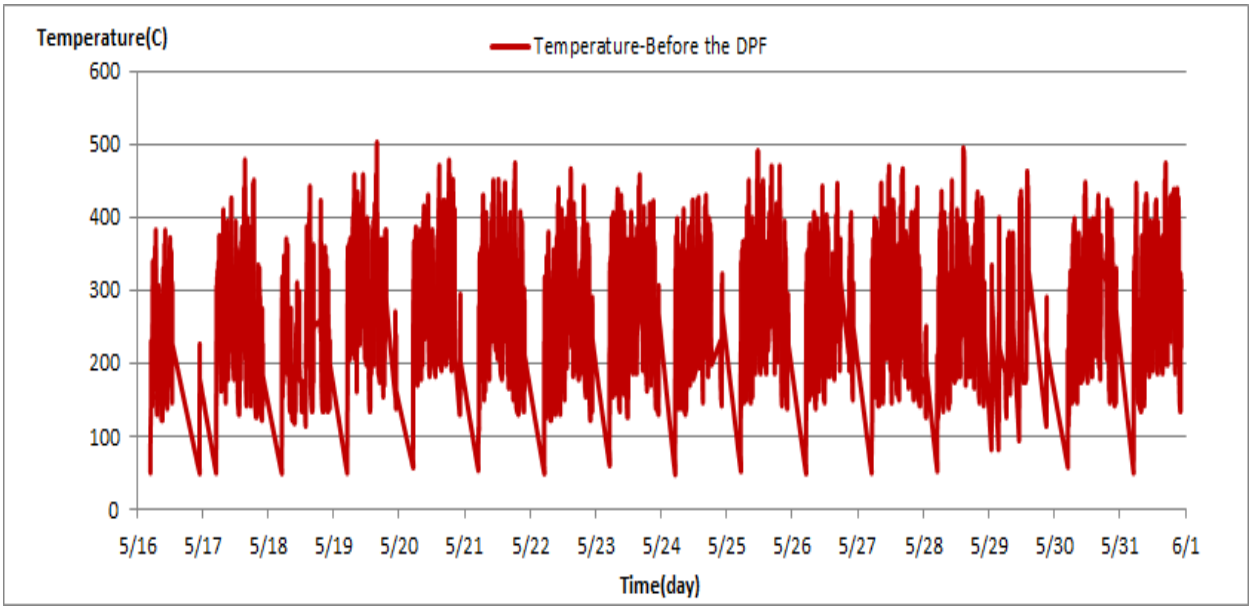


Figure 6- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

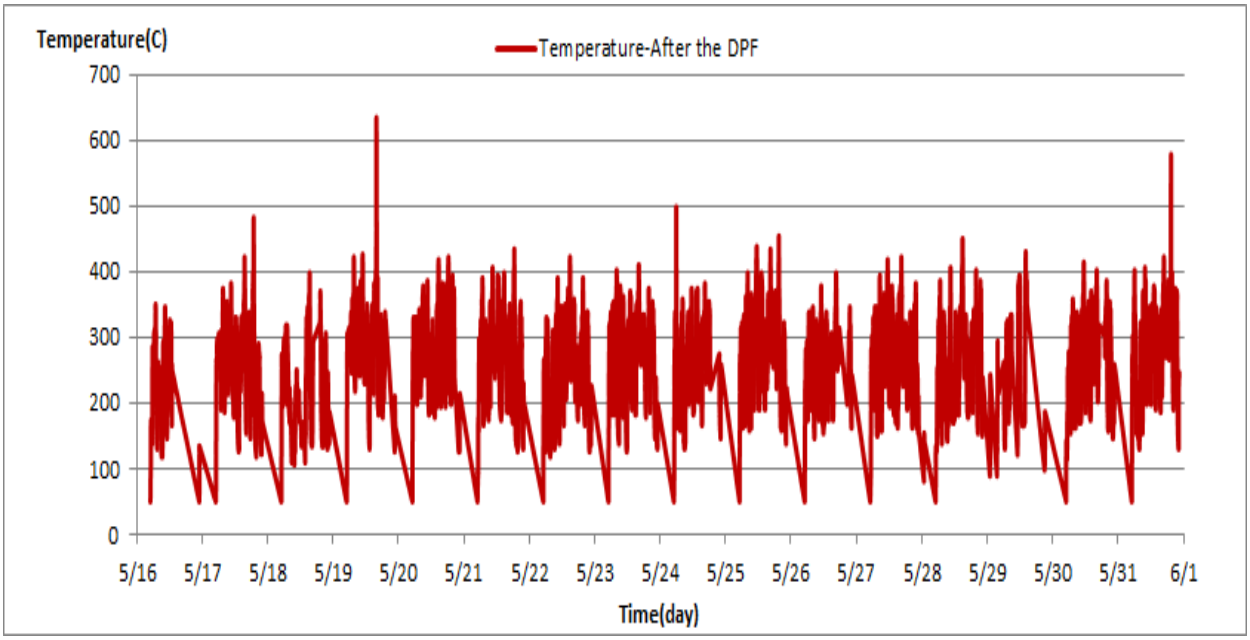


Figure 7- Temperature distribution over sixteen days

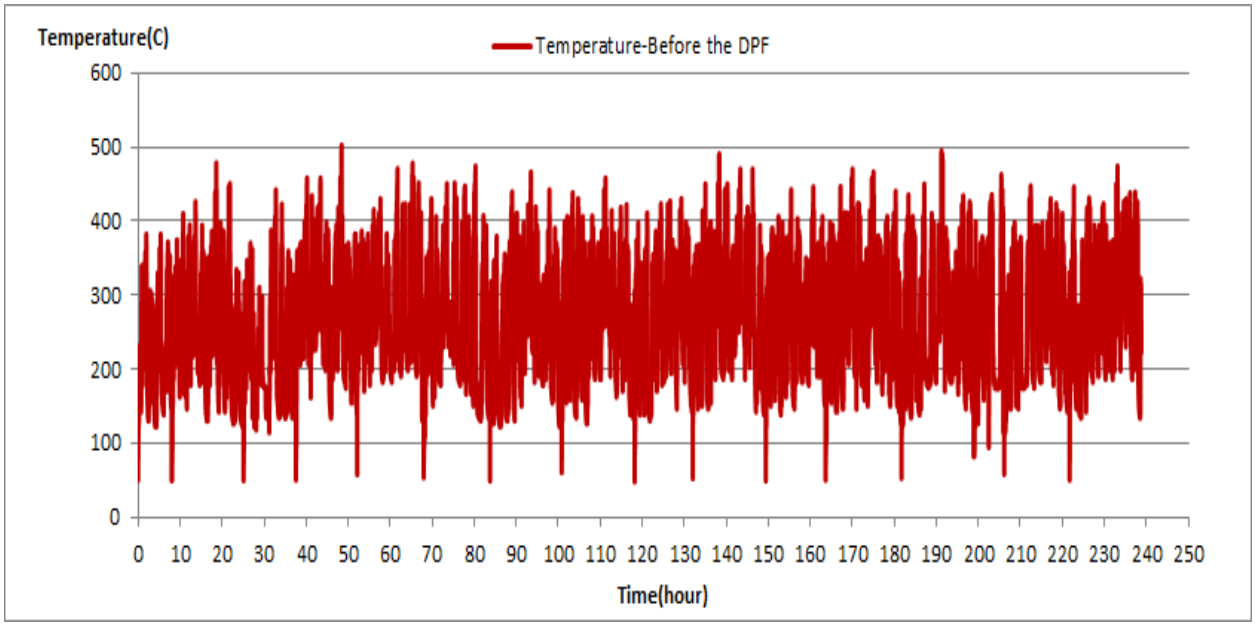


Figure 8- Before DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

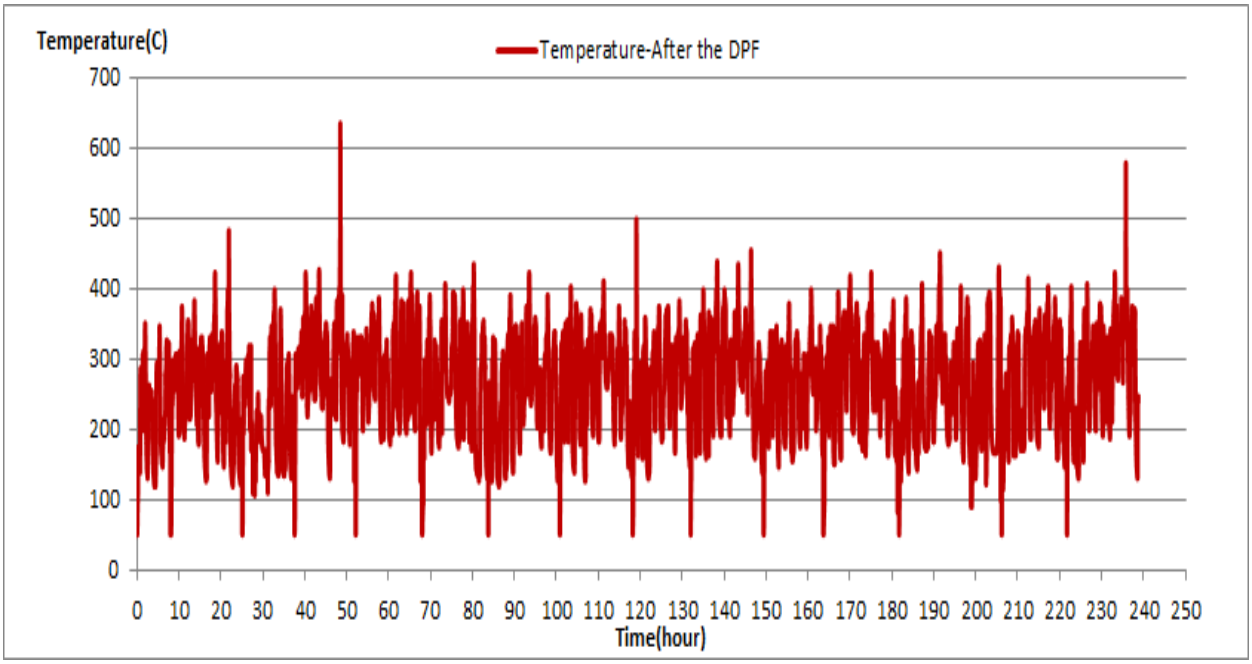


Figure 9- After DPF temperature vs. working hours

Engine Speed Diagrams

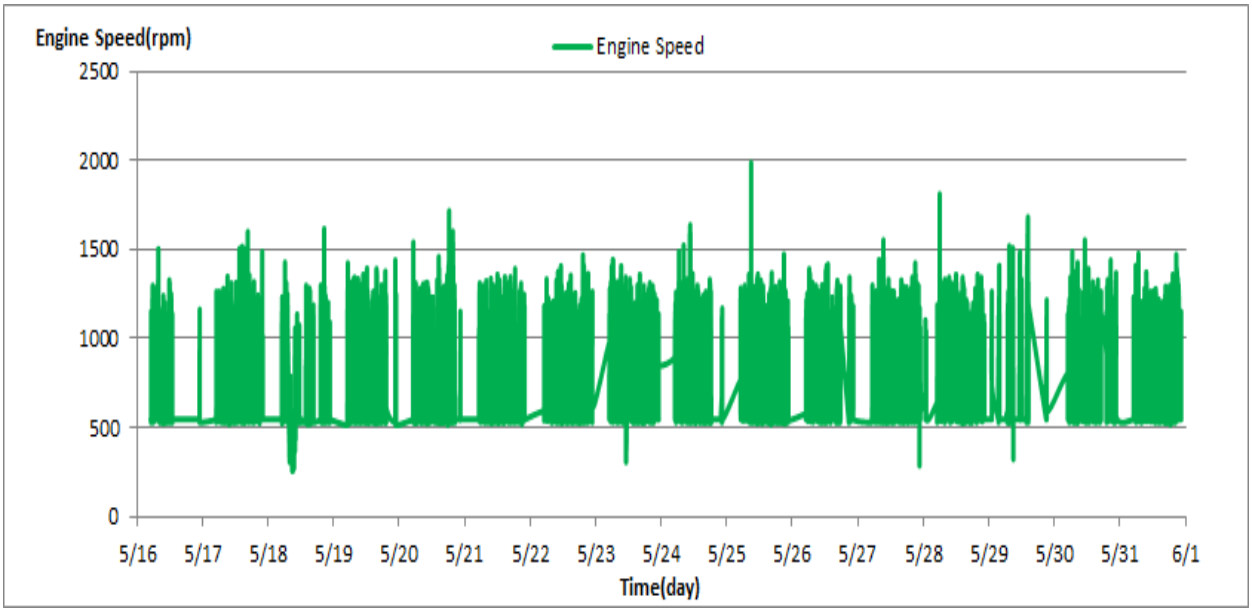


Figure 10- Engine speed distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

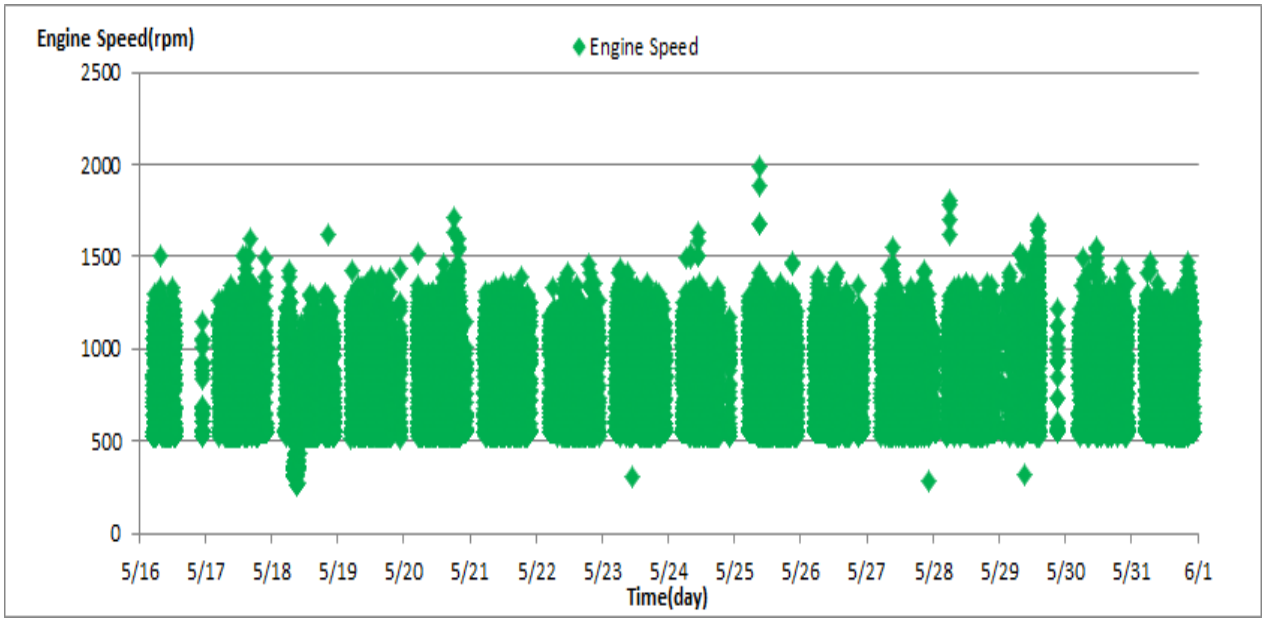


Figure 11- Engine speed diagram for calculating CPK's working days

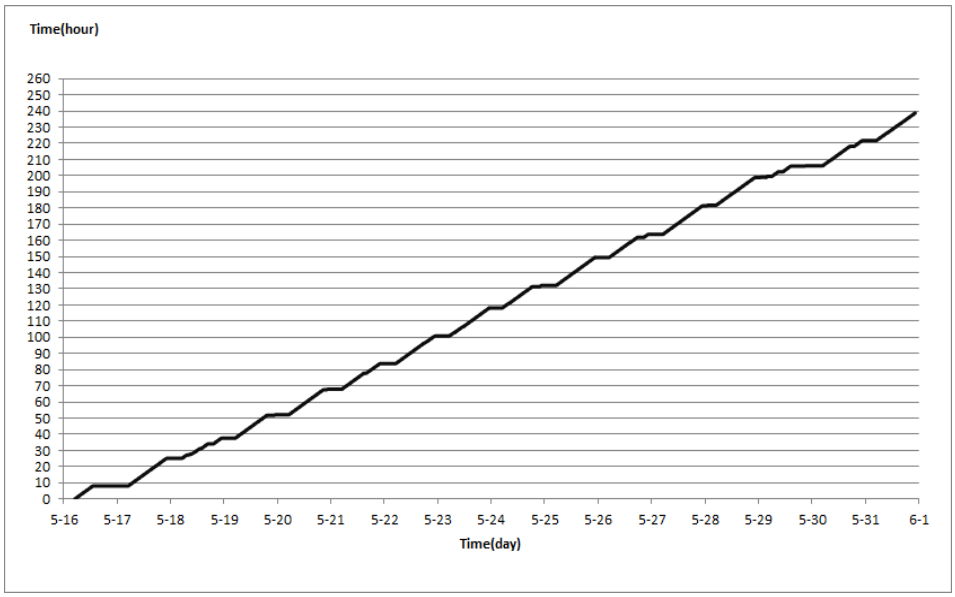


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with time (day) axis show days without data logger data. As depicted in Figure 12, data logger operated whole sixteen days.

All right reserved by ASA company – confidential no passing to third parties.

Pressure-Engine Speed diagrams

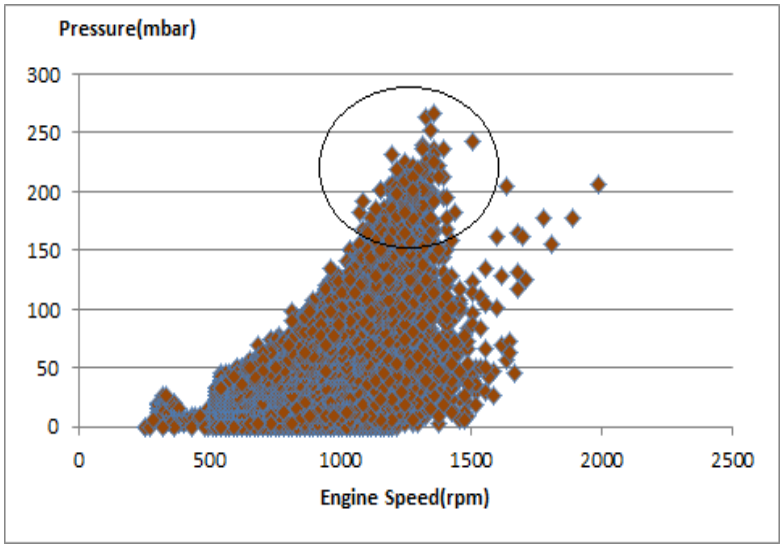


Figure 13- Pressure against speed

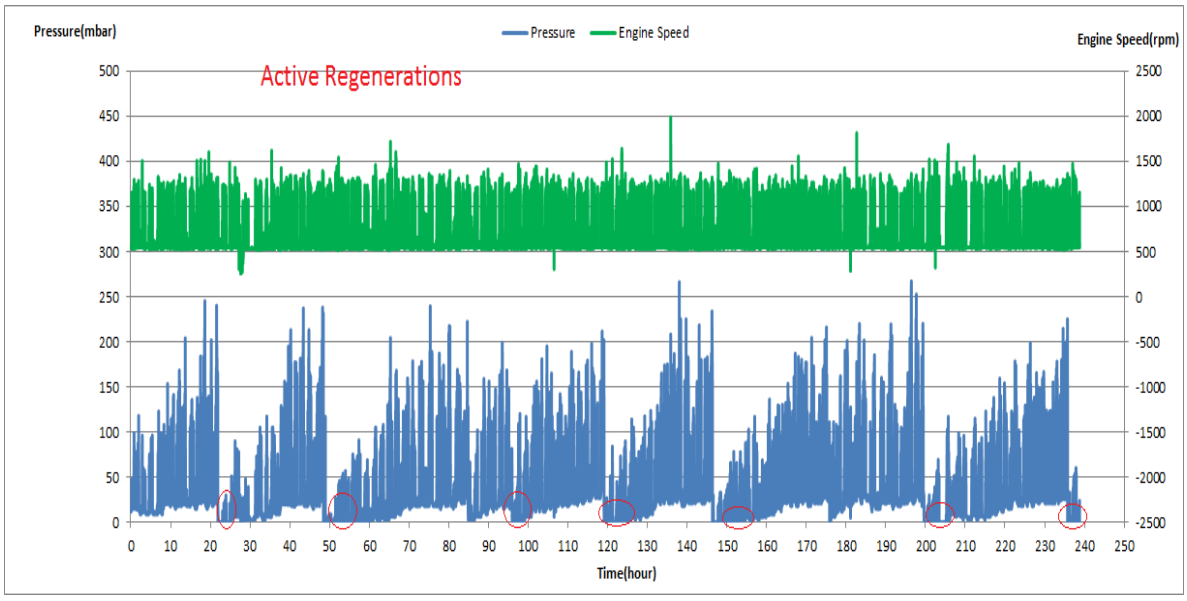


Figure 14- P,N distribution vs. working hours

Notice: The red circles show active regeneration times.

All right reserved by ASA company – confidential no passing to third parties.

Temperature- Engine Speed Diagram

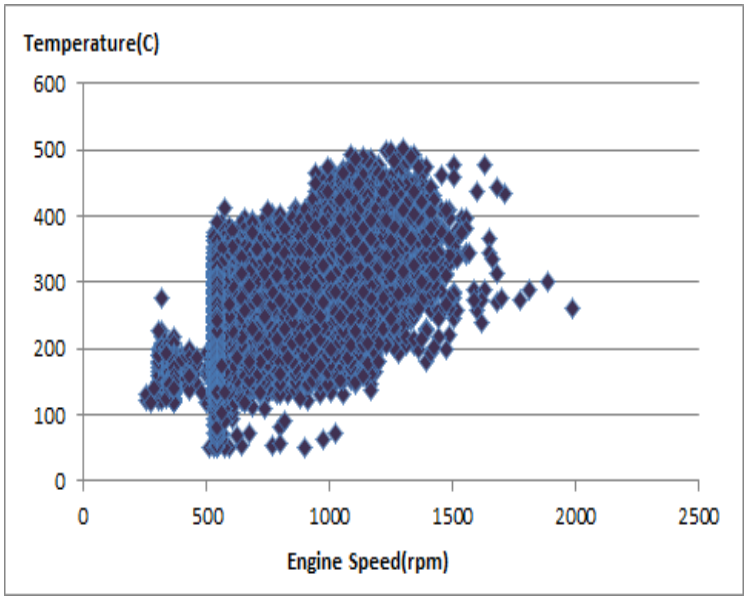


Figure 15- Temperature against speed

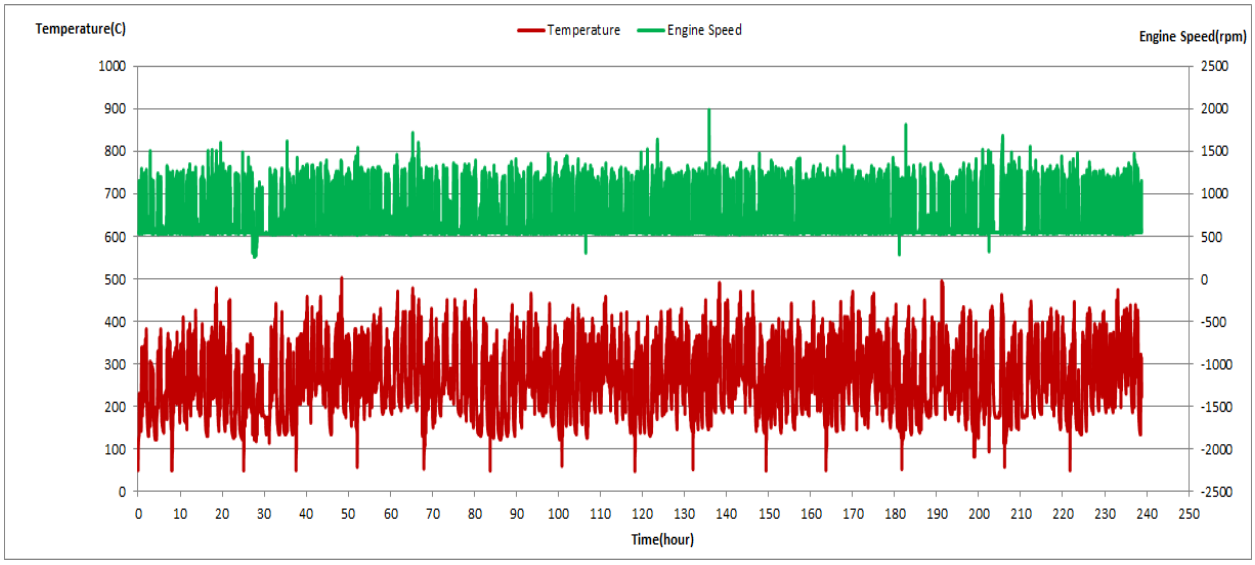


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

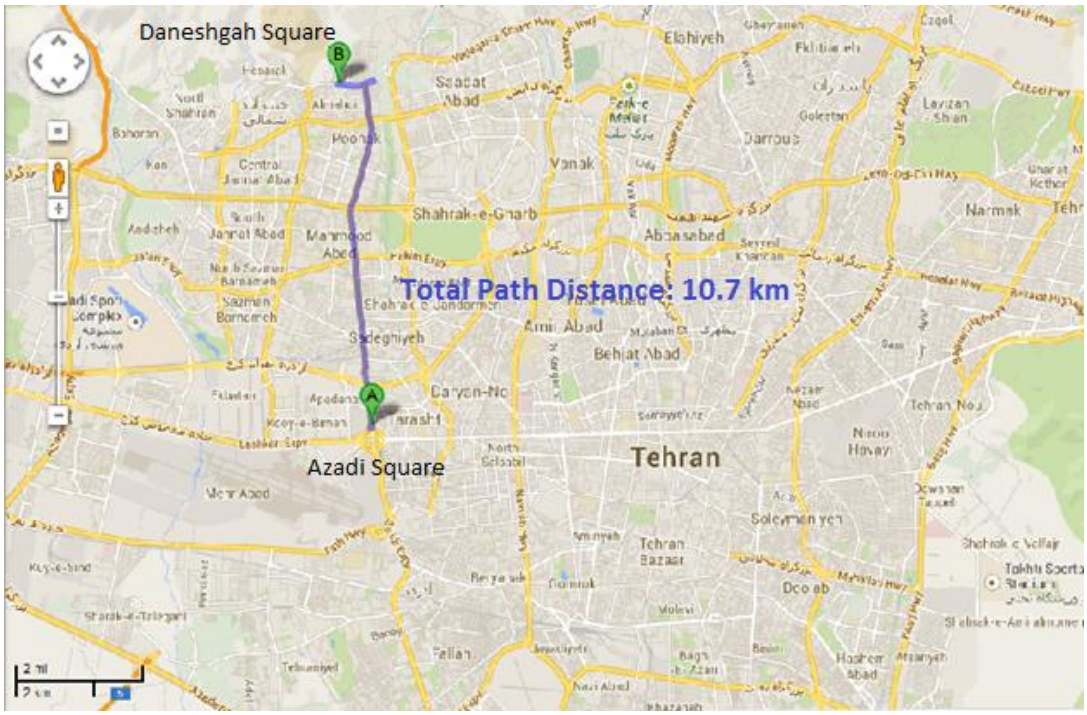
All right reserved by ASA company – confidential no passing to third parties.

- As depicted in Figure 1, only 0.07% of total working-time pressure is above 200 mbar and 0.5% above 150mbar. So it can be concluded that operation of this filter is reasonably acceptable in this condition.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that only 1.5% of total working-time temperature is above 400°C.
- This vehicle operates in line 2 and for its path characteristic, engine operates in low speed. It's worth-mentioning this low engine speed distribution causes low temperature distribution.

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

All right reserved by ASA company – confidential no passing to third parties.

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



All right reserved by ASA company – confidential no passing to third parties.

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/May/2015 – 15/May/2015 (fifteen days)
K value - DPF upstream	1.29 $[m^{-1}]$
K value – DPF downstream	0.09 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	12030 km
Bus mileage over the period	1533 km
Working days over the period	9 days
Stop days	6 day
Data logger working days	9 days
Working hours over the period	142.28 hours
Average working hours per day (including stop days)	9.49 hours
Bus average speed	10.77 km/hr
idle speed time to all working time ration	49%
Total Bus fuel consumption over the period	1103 lit
fuel consumption per hour	7.75 lit/hr
Average fuel consumption	0.72 lit/km
Total Bus additive consumption over the period	0.46 lit
Average additive consumption	0.302 cc/km
additive consumption to fuel ration	420 cc per 1000 lit (Batch Dosing with Tank Level)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

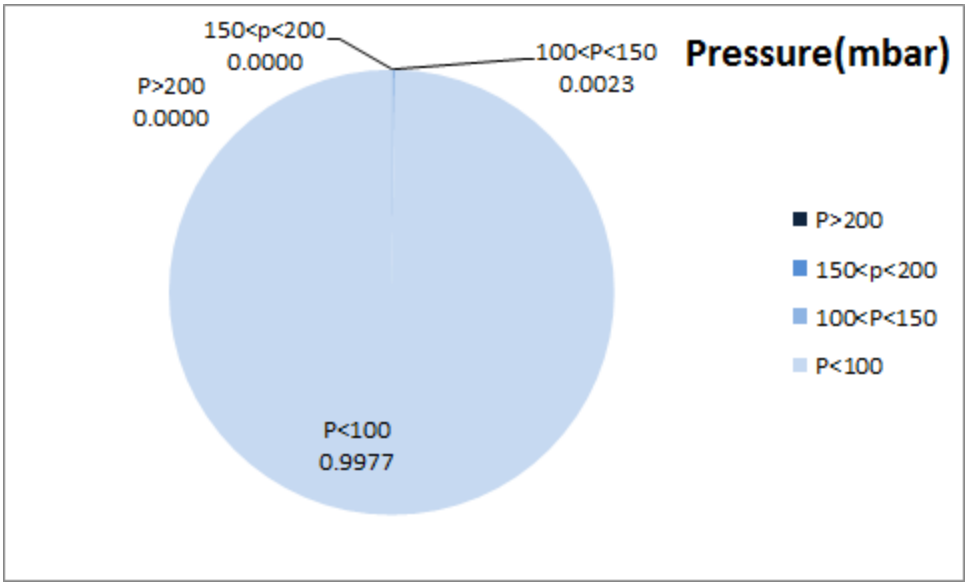


Figure 1- Pressure distribution over the working hours

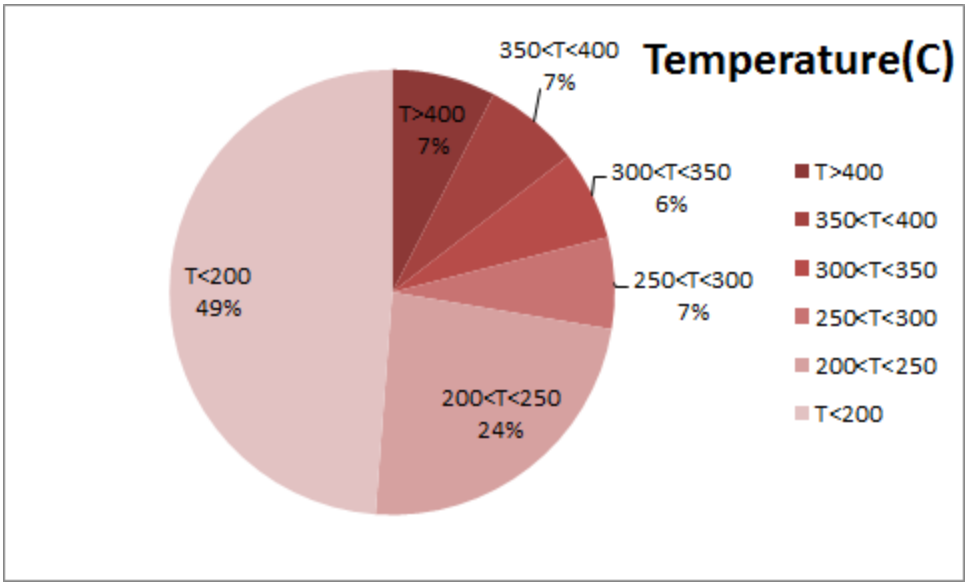


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

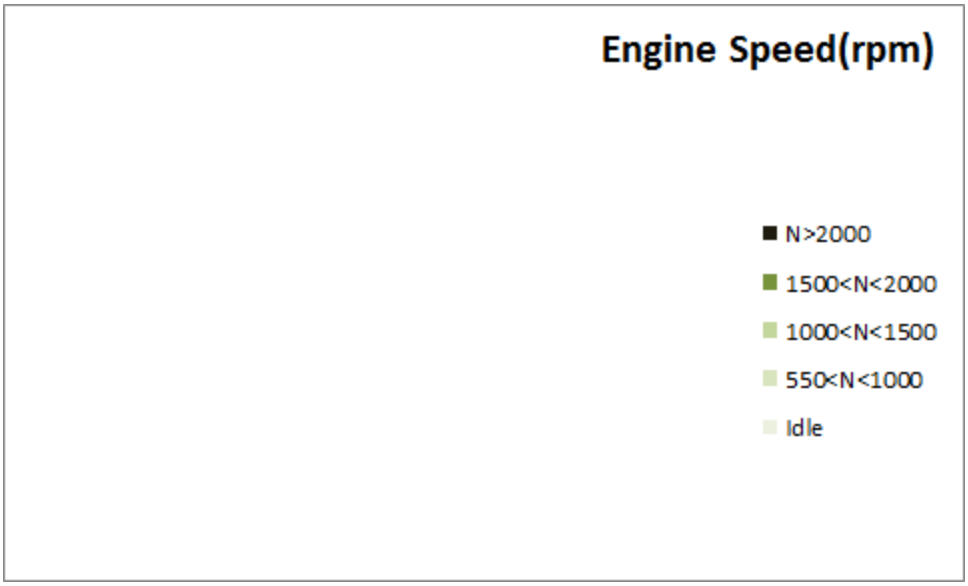


Figure 3- Engine speed distribution over the working hours

Notice: because of engine speed sensor 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)
224.1	11.12	-

Table 4- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
294.9	17.59	-

Table 5- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
514-70	150-0	-

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

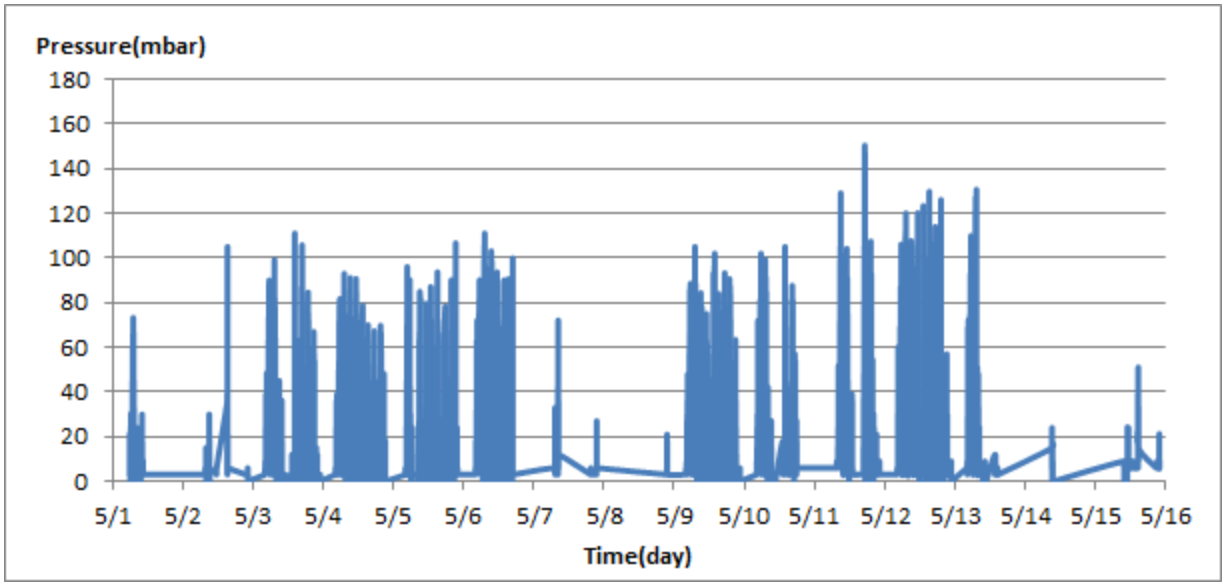


Figure 4- Pressure distribution over fifteen days

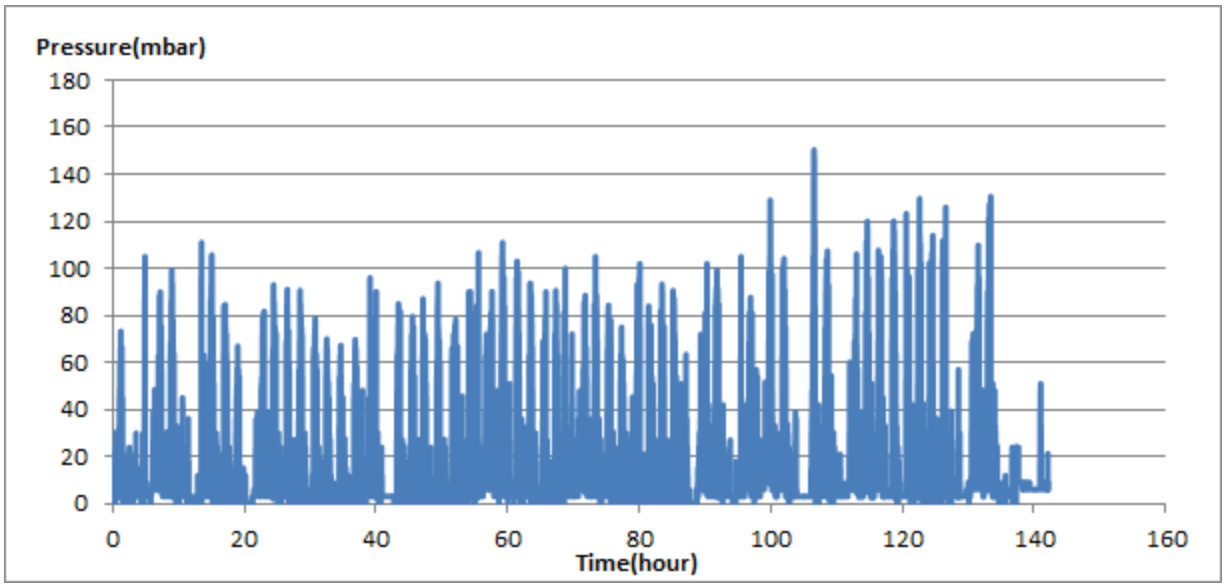


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

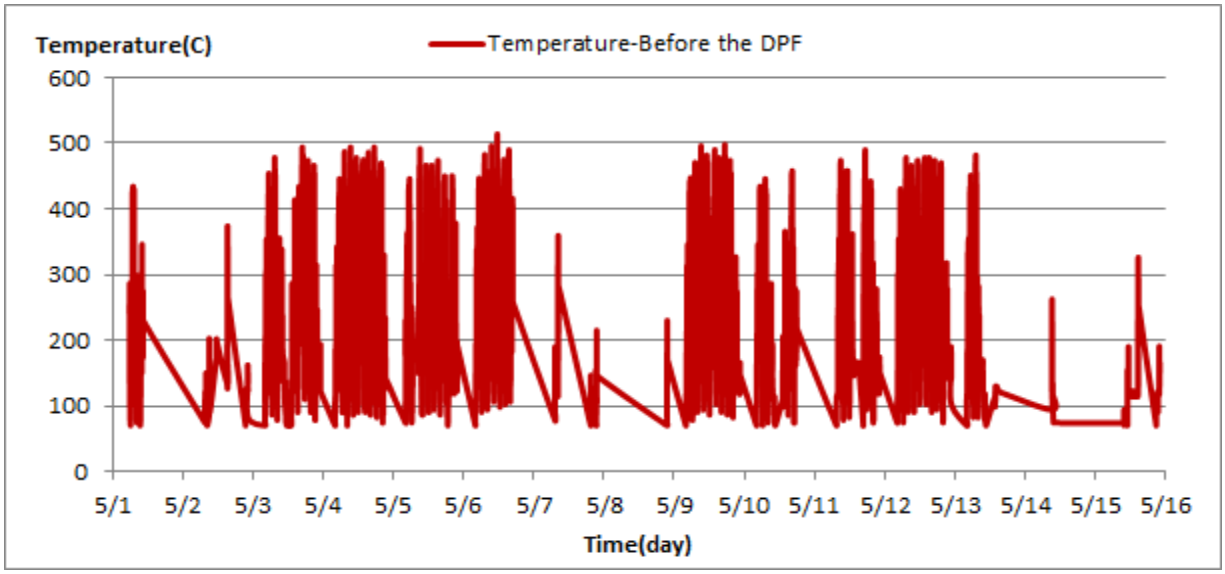


Figure 6- Temperature distribution over fifteen days

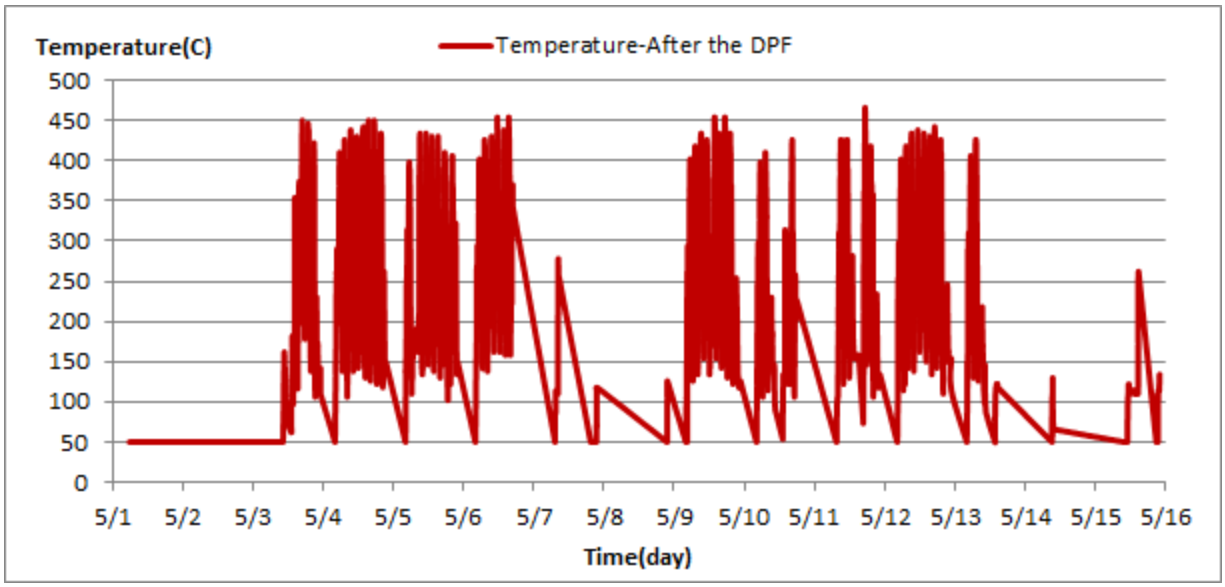


Figure 7- Temperature distribution over fifteen days

Notice: Temperature sensor was installed after the DPF on May 3rd. So before this time CPK's monitored 50°C.

All right reserved by ASA company – confidential no passing to third parties.

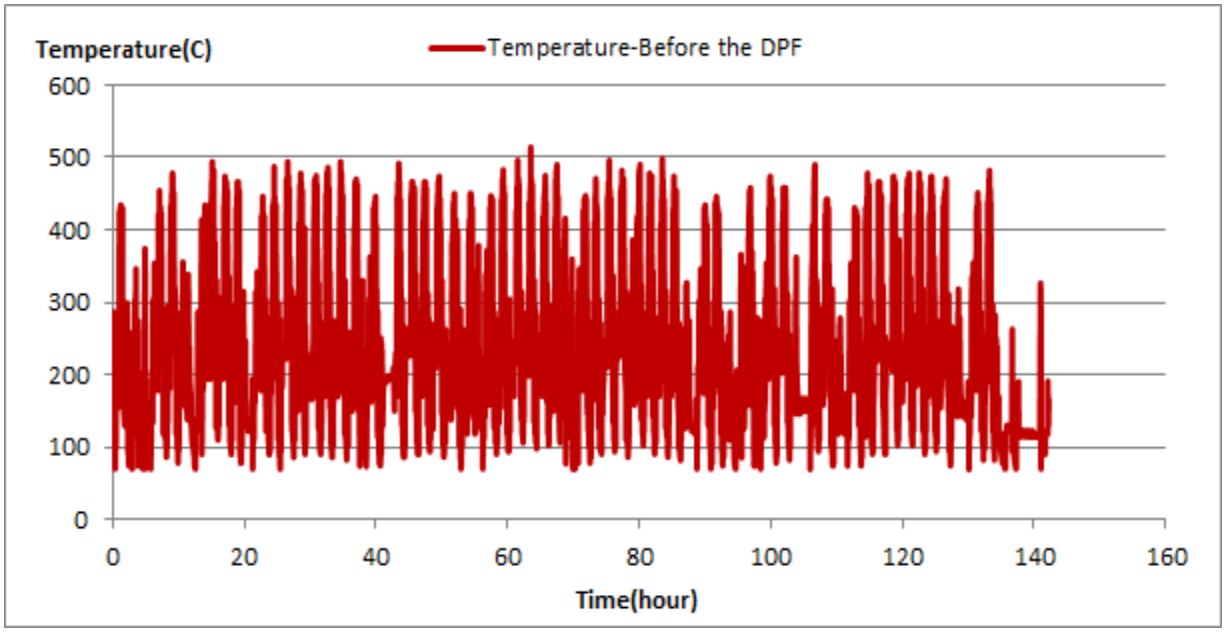


Figure 8- Before DPF temperature vs. working hours

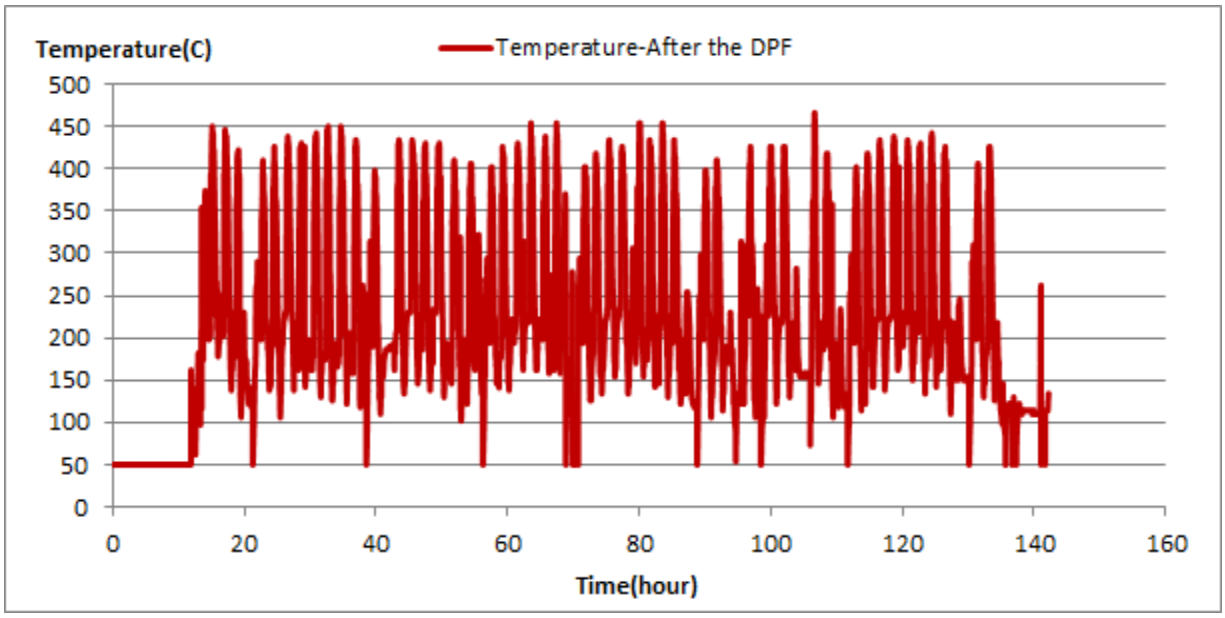


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

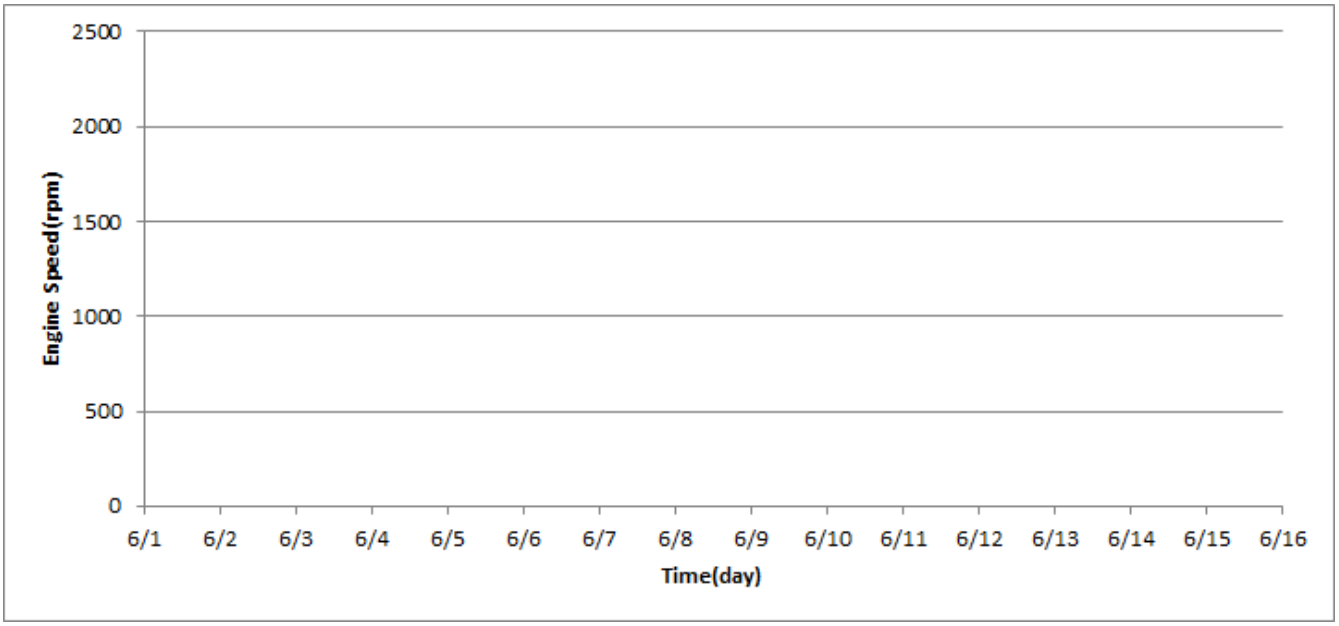


Figure 10- Engine speed distribution over fifteen days

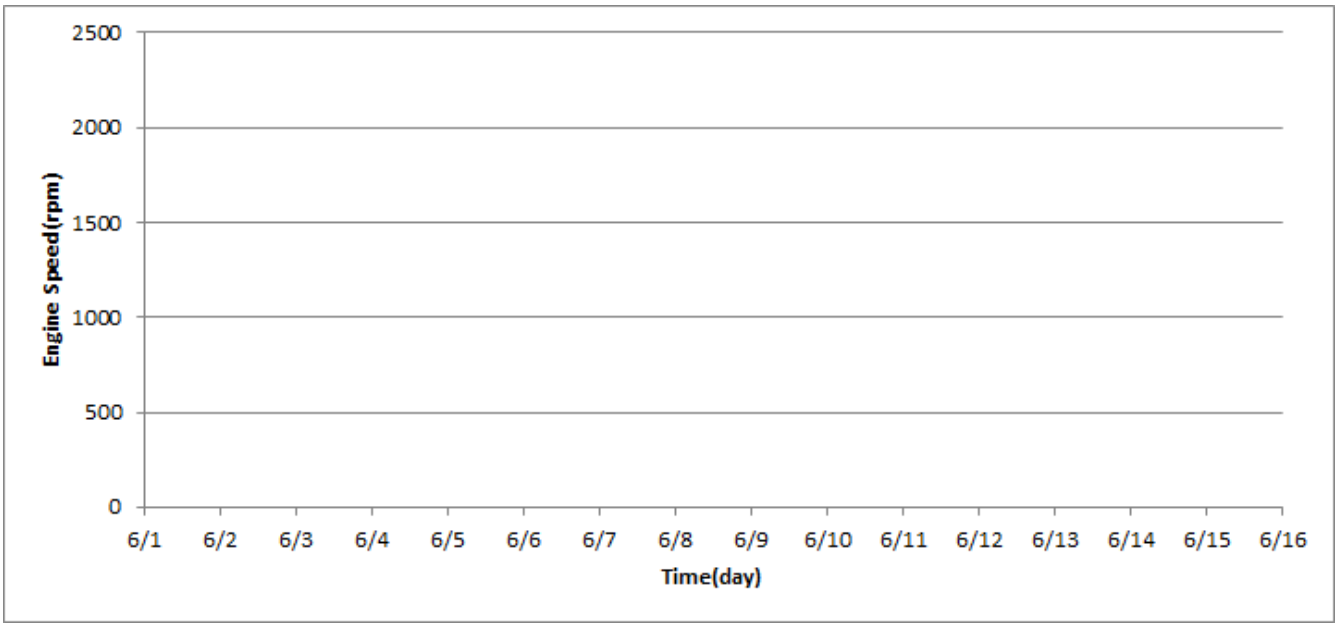


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

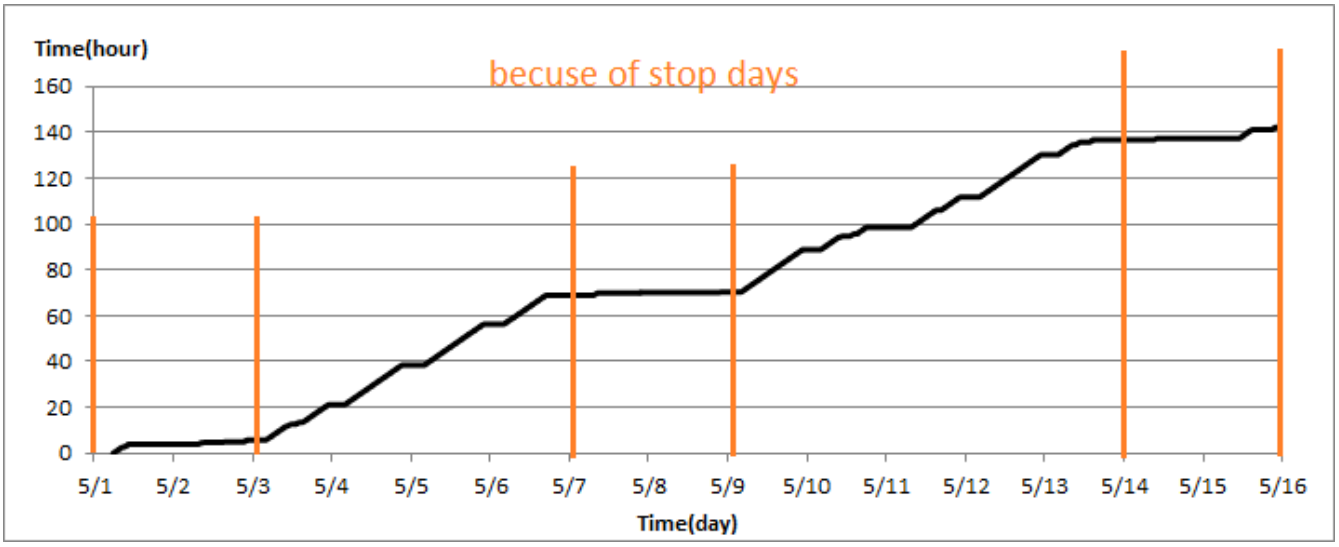


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

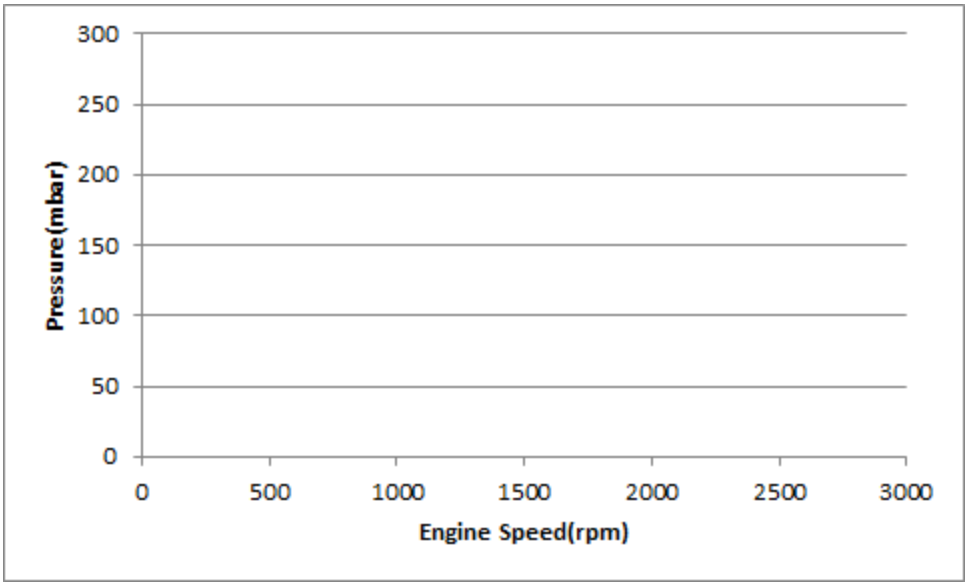


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

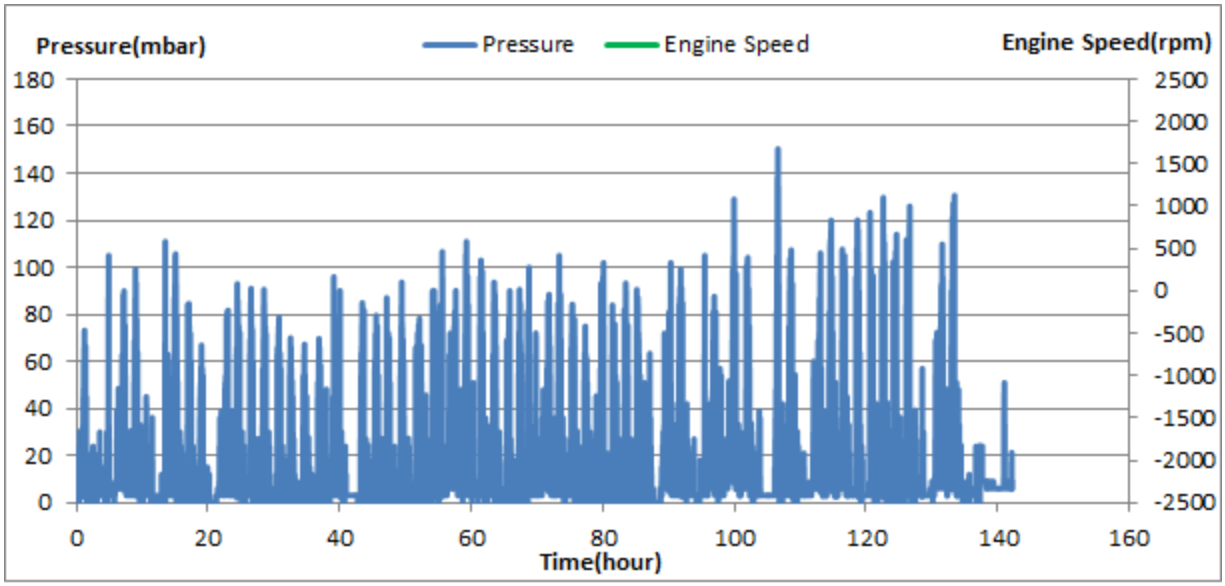


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

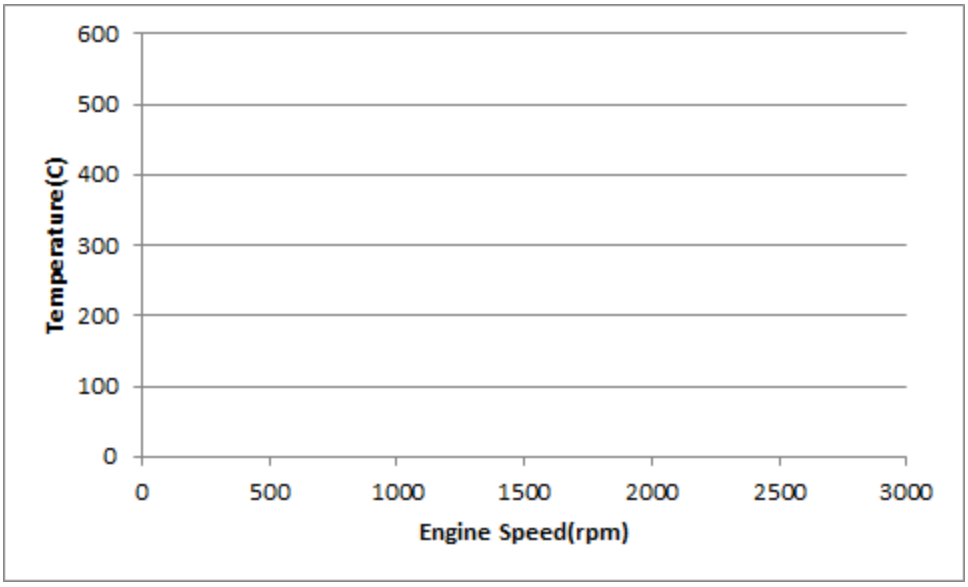


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

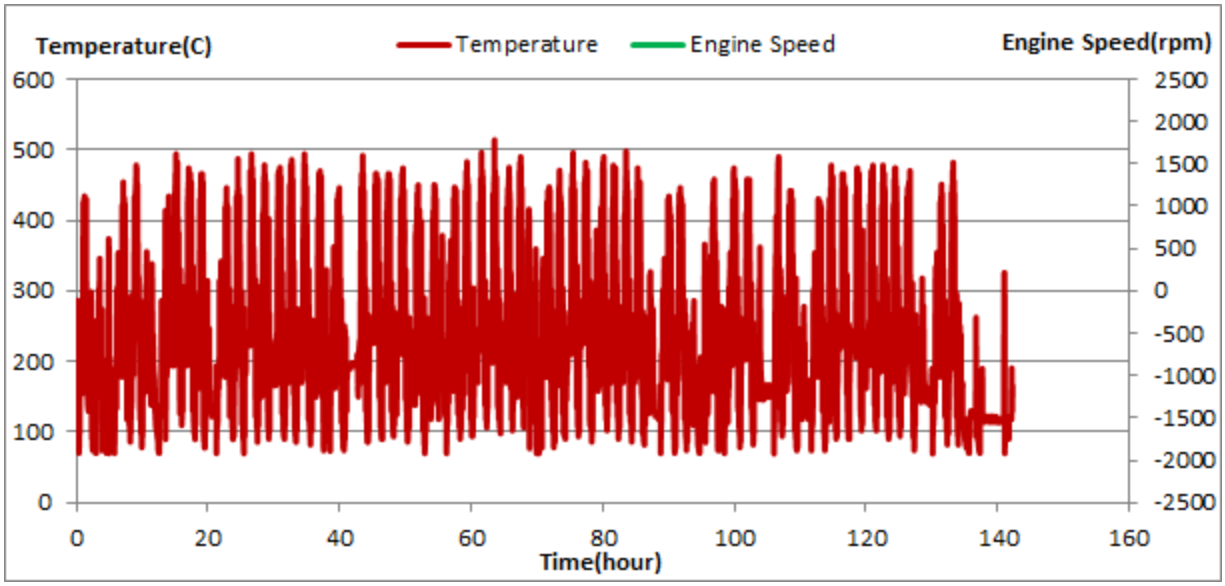


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 150 can't be observed.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 7% of total working-time temperature is above 400 °C and 14% above 350°C.

❖ **As mentioned above, engine speed sensor had problem in this period. Hence for calculating some data temperature's data used instead of engine speed's data (idling time for example).**

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

All right reserved by ASA company – confidential no passing to third parties.

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	HJS_04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	16/May/2015 – 31/May/2015 (sixteen days)
K value - DPF upstream	1.29 $[m^{-1}]$
K value – DPF downstream	0.09 $[m^{-1}]$

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.

All right reserved by ASA company – confidential no passing to third parties.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	14494 km
Bus mileage over the period	2464 km
Working days over the period	13 days
Stop days	3 day
Data logger working days	13 days
Working hours over the period	227.73 hours
Average working hours per day (including stop days)	14.23 hours
Bus average speed	10.82 km/hr
idle speed time to all working time ration	47%
Total Bus fuel consumption over the period	1931 lit
fuel consumption per hour	8.48 lit/hr
Average fuel consumption	0.78 lit/km
Total Bus additive consumption over the period	0.81 lit
Average additive consumption	0.329 cc/km
additive consumption to fuel ration	420 cc per 1000 lit (Batch Dosing with Tank Level)

All right reserved by ASA company – confidential no passing to third parties.

Temperature, Pressure and Engine Speed Overview

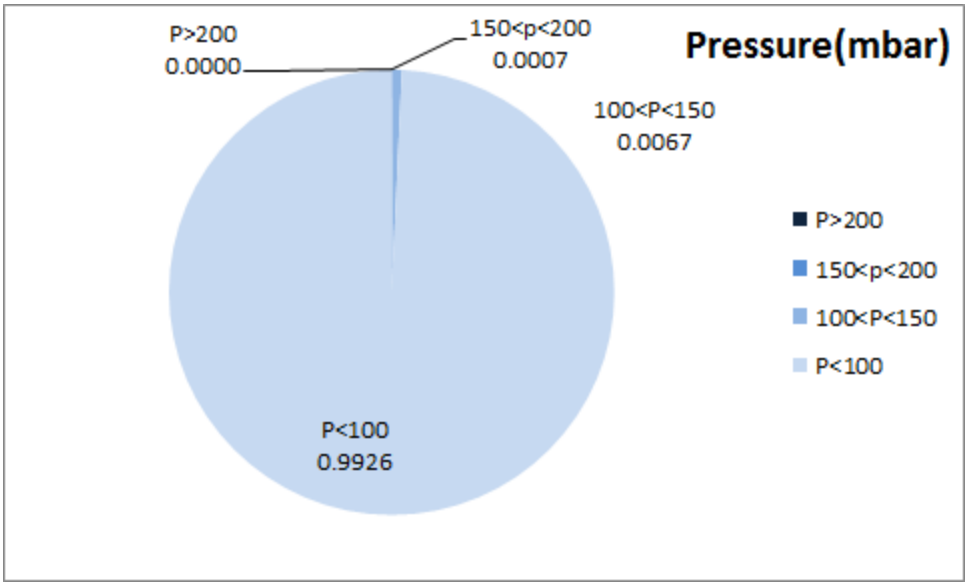


Figure 1- Pressure distribution over the working hours

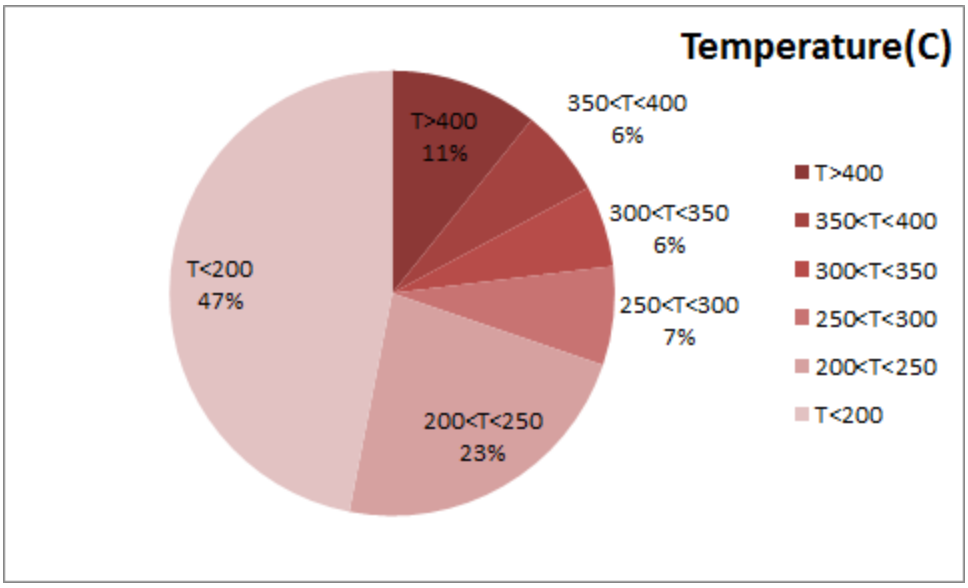


Figure 2-Temperature[1] distribution over the working hours

[1] - Exhaust temperature before the DPF

All right reserved by ASA company – confidential no passing to third parties.

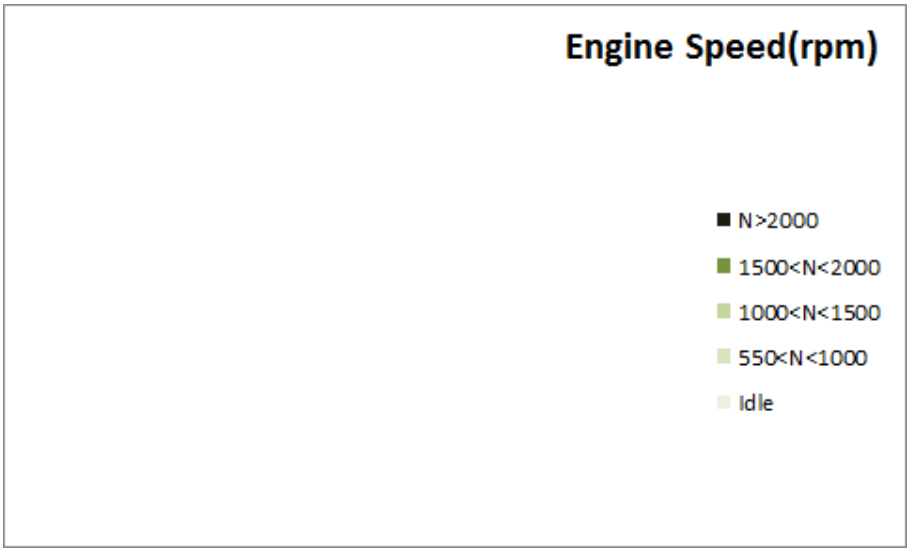


Figure 3- Engine speed distribution over the working hours

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

Table 4- Mean values

Mean temperature[2](C)	Mean pressure(mbar)	Mean engine speed(rpm)
235	10.96	-

Table 5- Mean values without idling

Mean temperature(C)	Mean pressure(mbar)	Mean engine speed(rpm)
307.04	17.39	-

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
602-74	195-0	-

[2] - Temperature of before the DPF

All right reserved by ASA company – confidential no passing to third parties.

Detailed Pressure Analysis

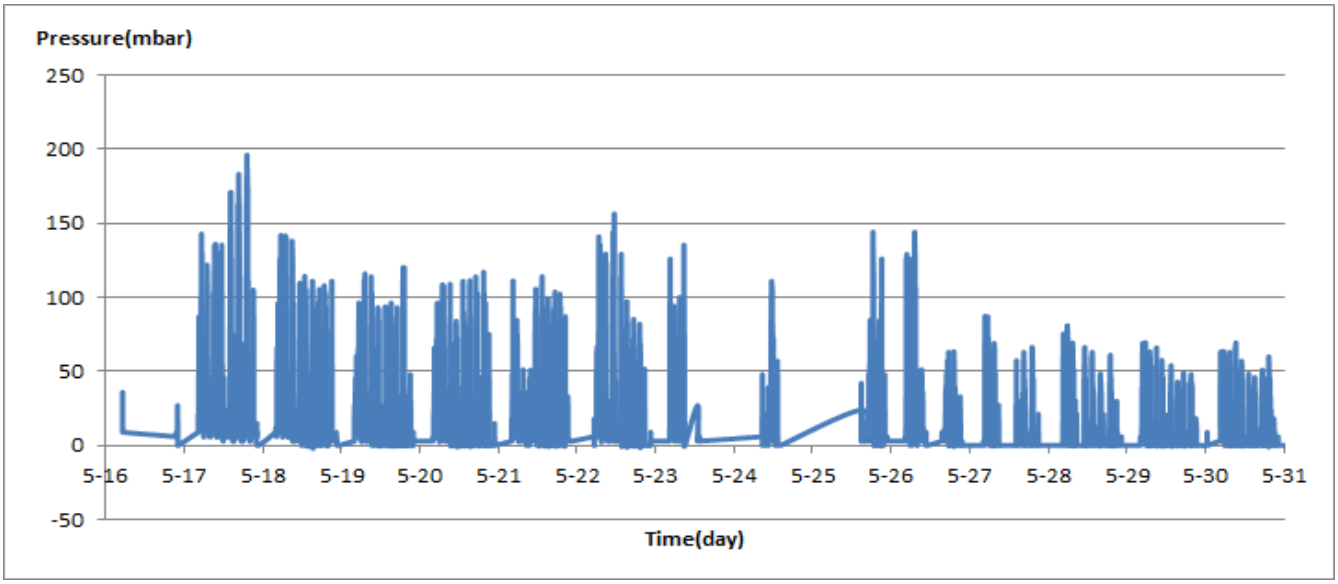


Figure 4- Pressure distribution over sixteen days

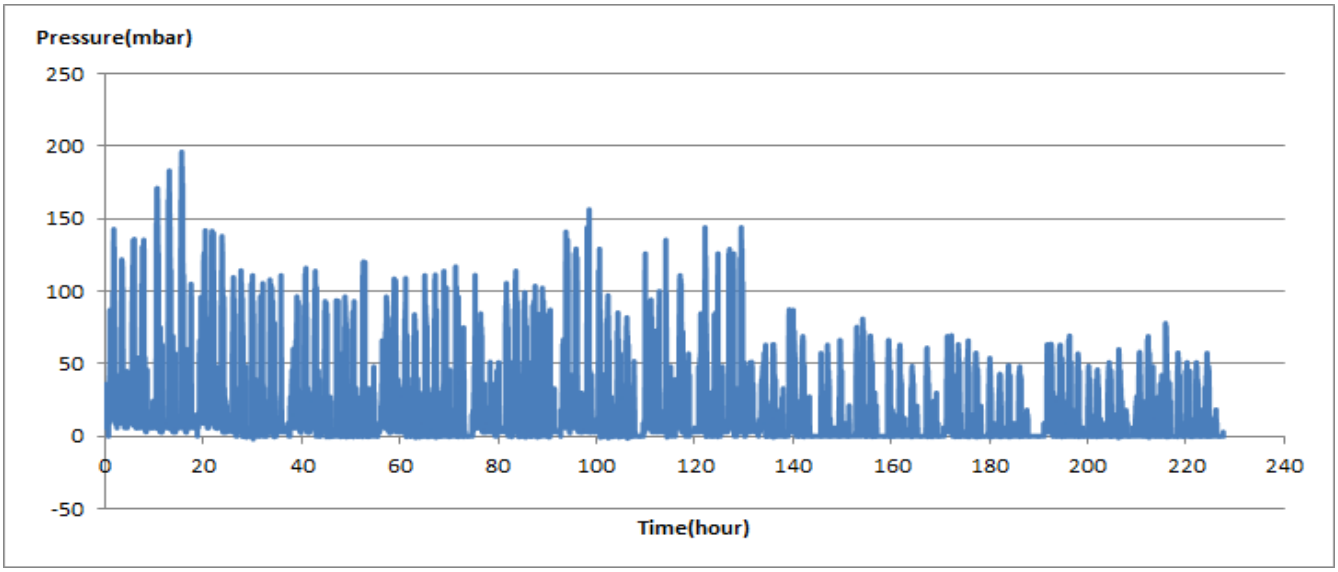


Figure 5- Pressure vs. working hours

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

All right reserved by ASA company – confidential no passing to third parties.

Detailed Temperature Analysis

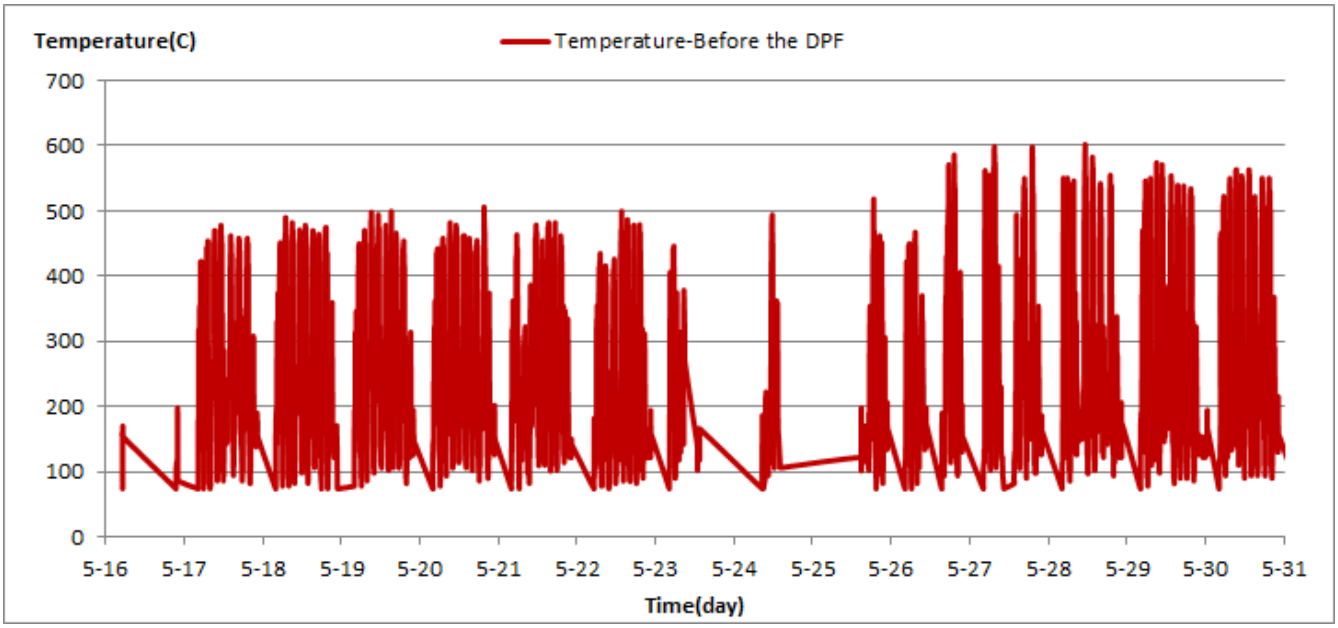


Figure 6- Temperature distribution over sixteen days

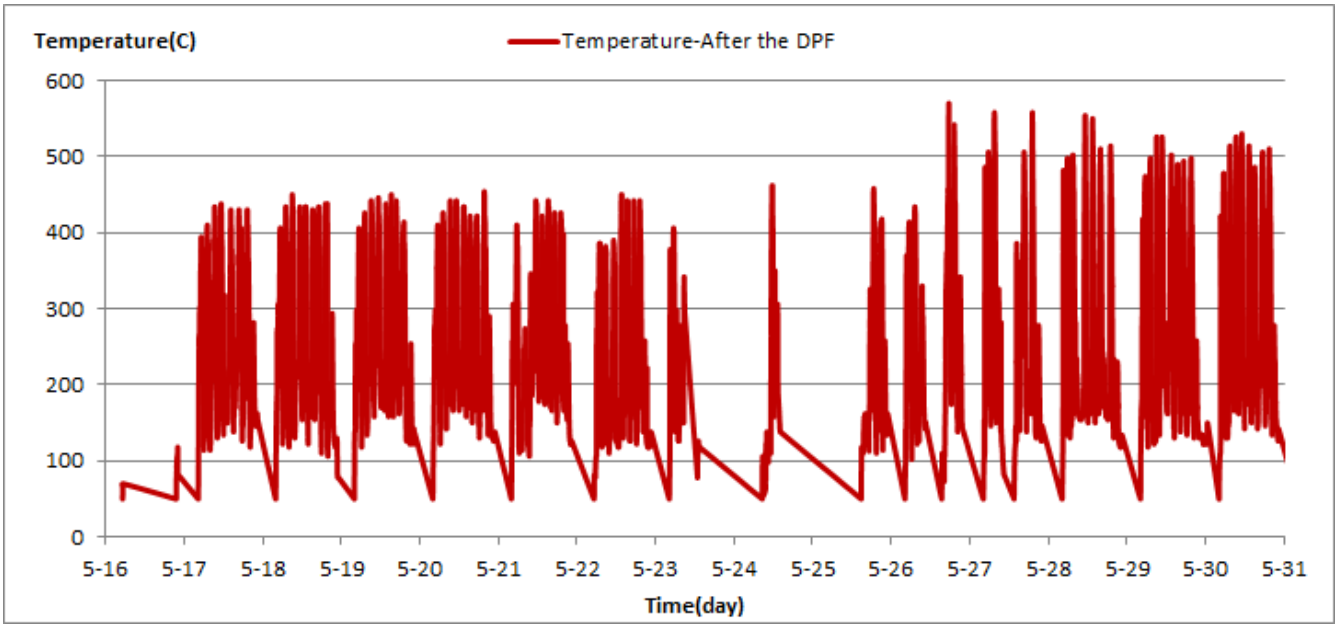


Figure 7- Temperature distribution over sixteen days

All right reserved by ASA company – confidential no passing to third parties.

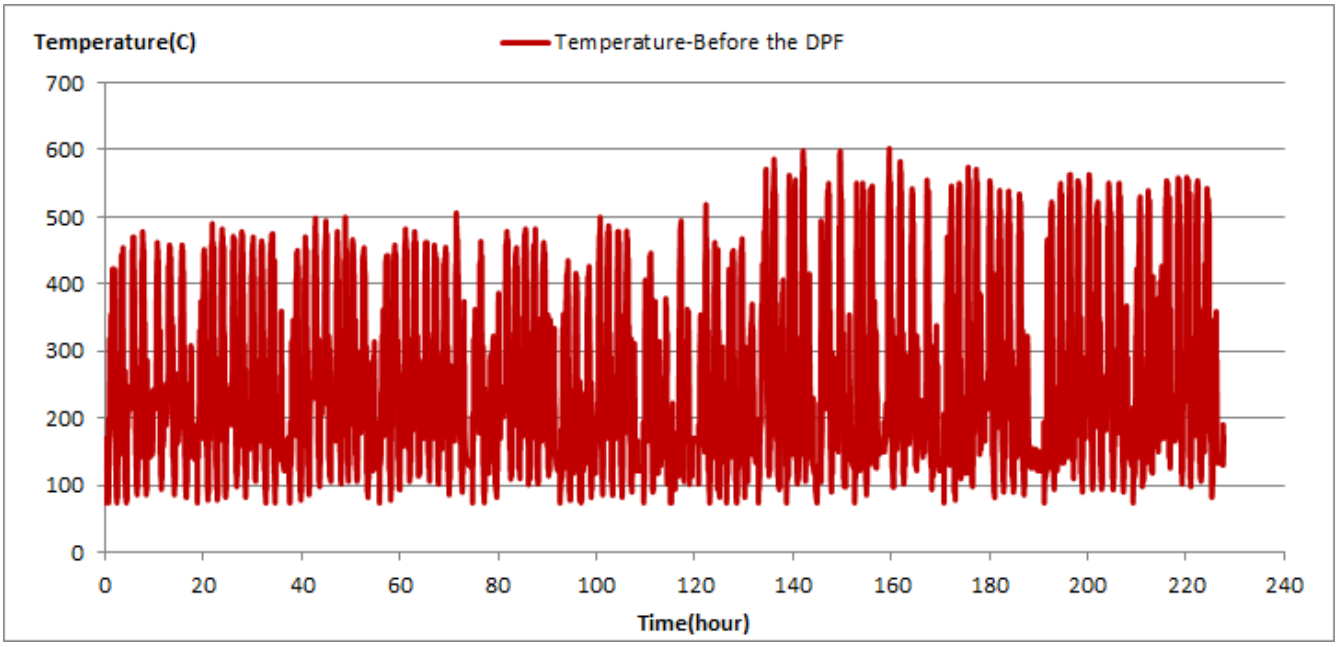


Figure 8- Before DPF temperature vs. working hours

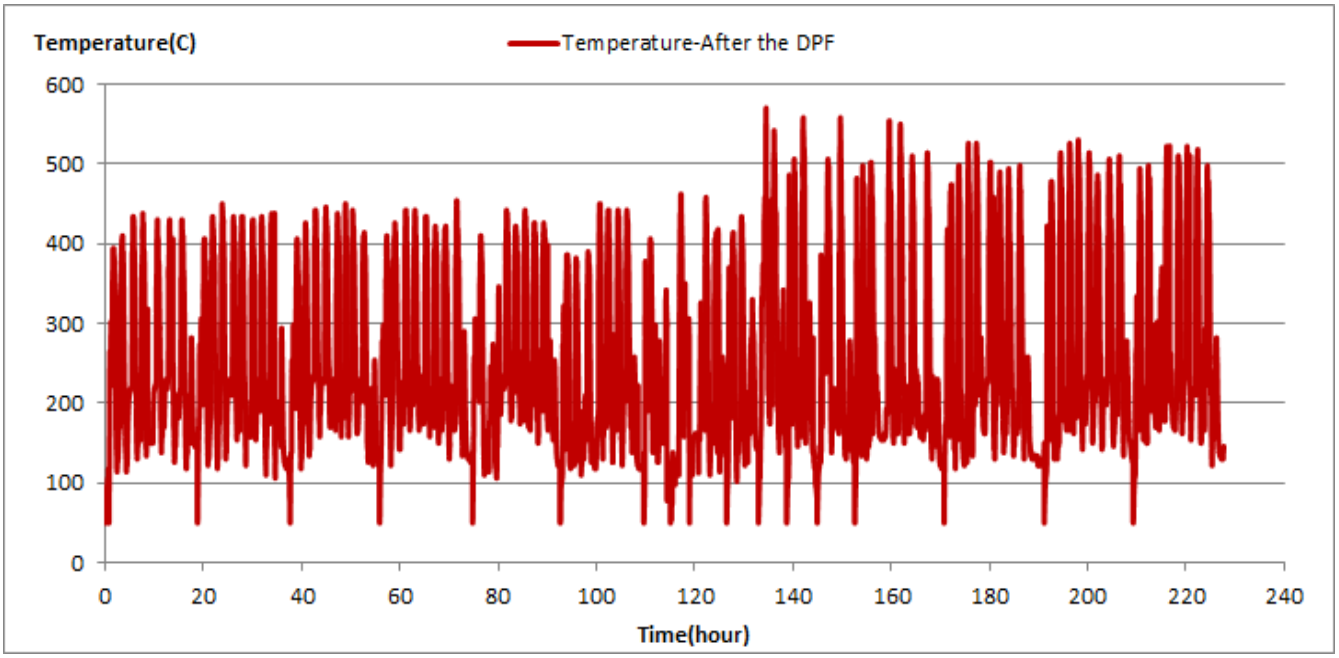


Figure 9- After DPF temperature vs. working hours

All right reserved by ASA company – confidential no passing to third parties.

Engine Speed Diagrams

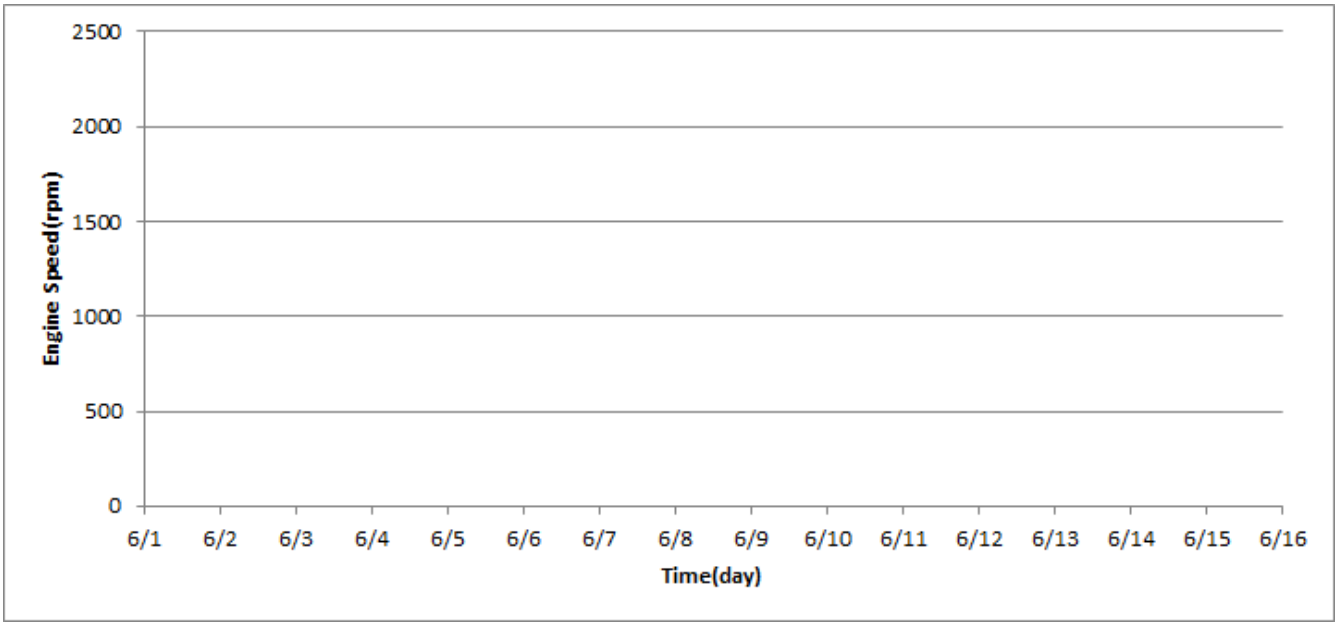


Figure 10- Engine speed distribution over sixteen days

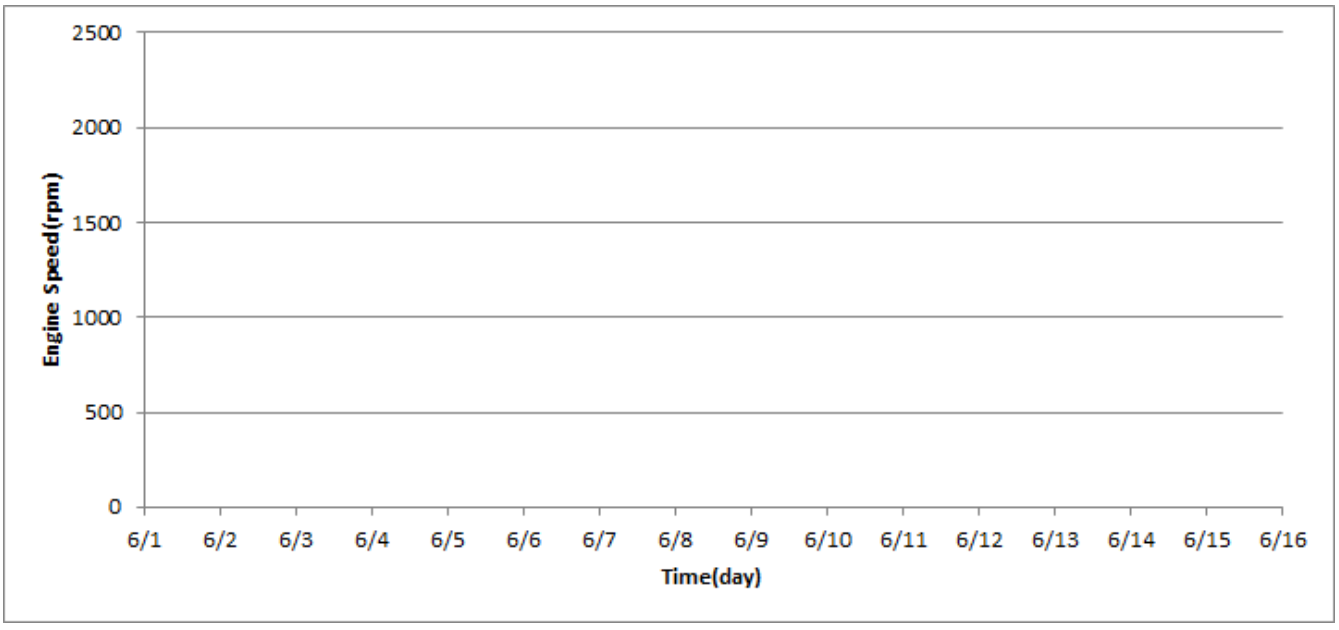


Figure 11- Engine speed diagram for calculating CPK's working days

All right reserved by ASA company – confidential no passing to third parties.

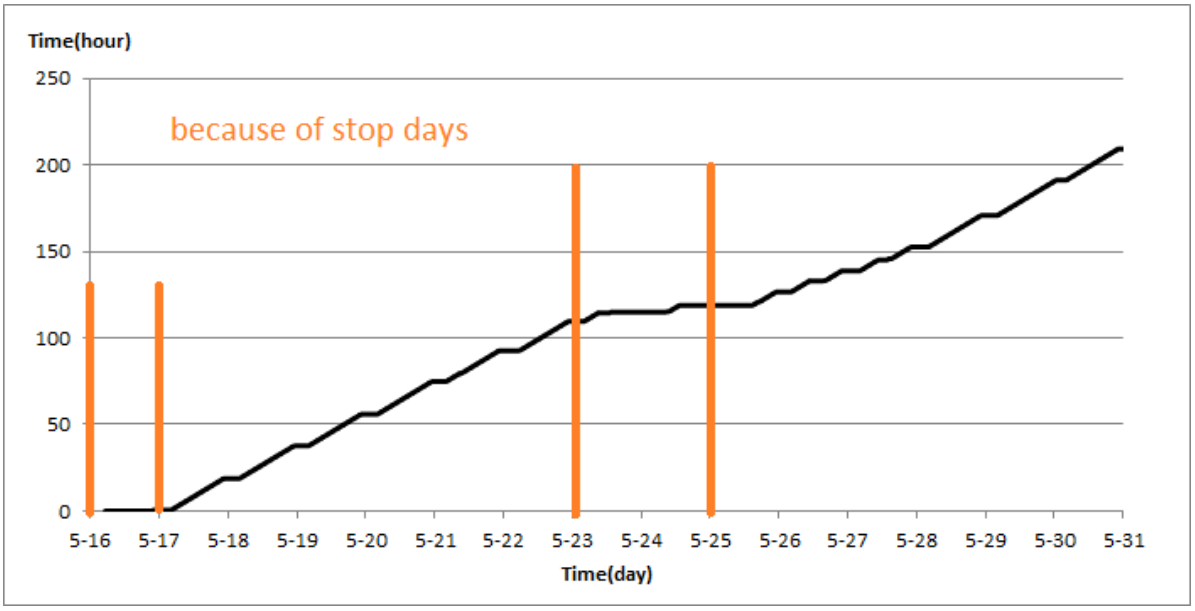


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

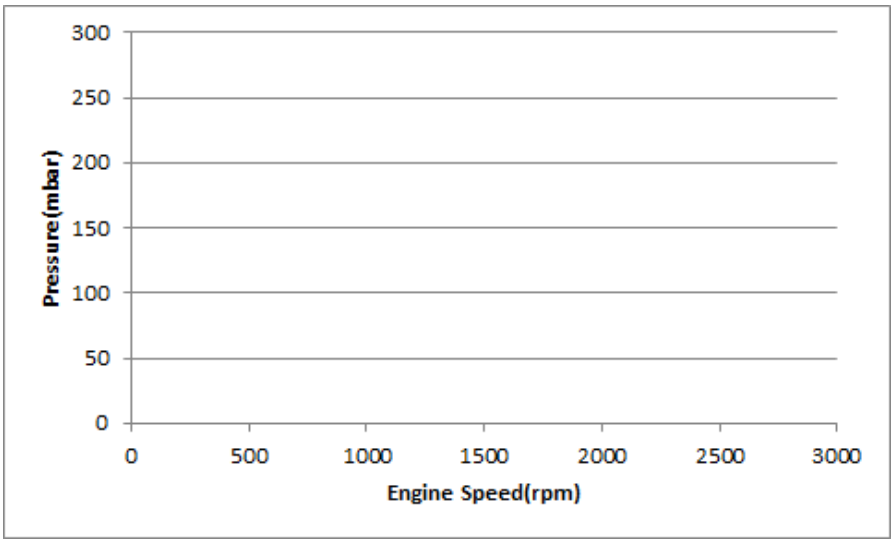


Figure 13- Pressure against speed

All right reserved by ASA company – confidential no passing to third parties.

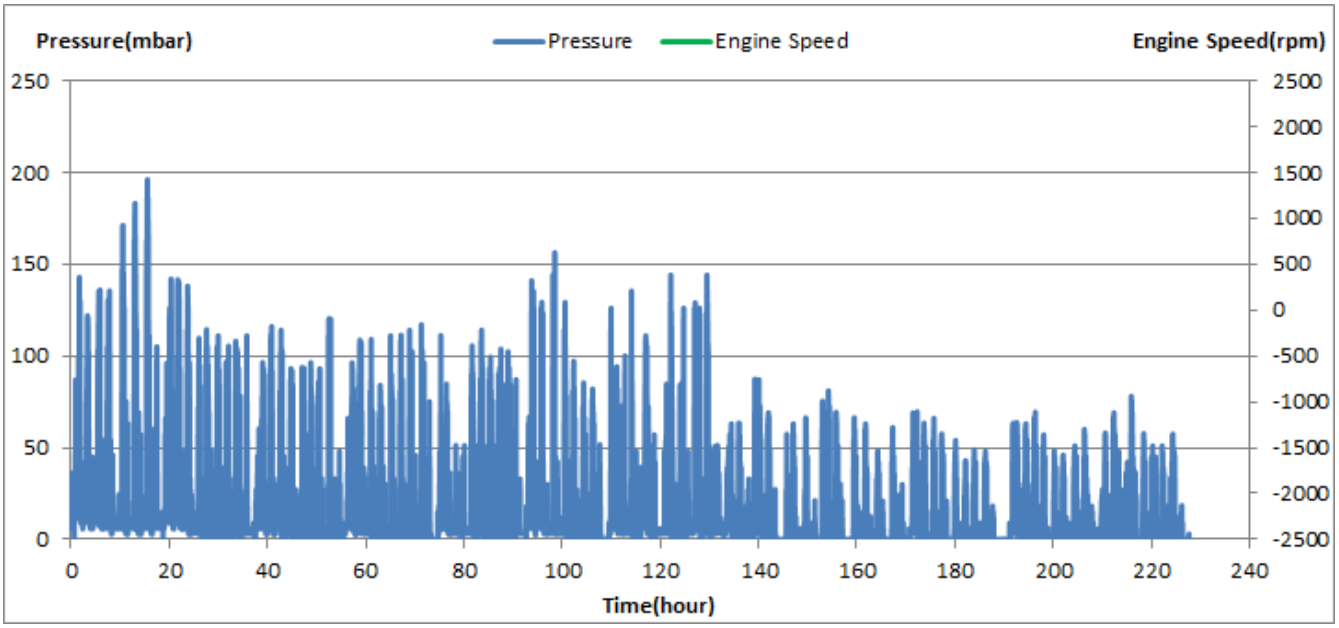


Figure 14- P, N distribution vs. working hours

Temperature- Engine Speed Diagram

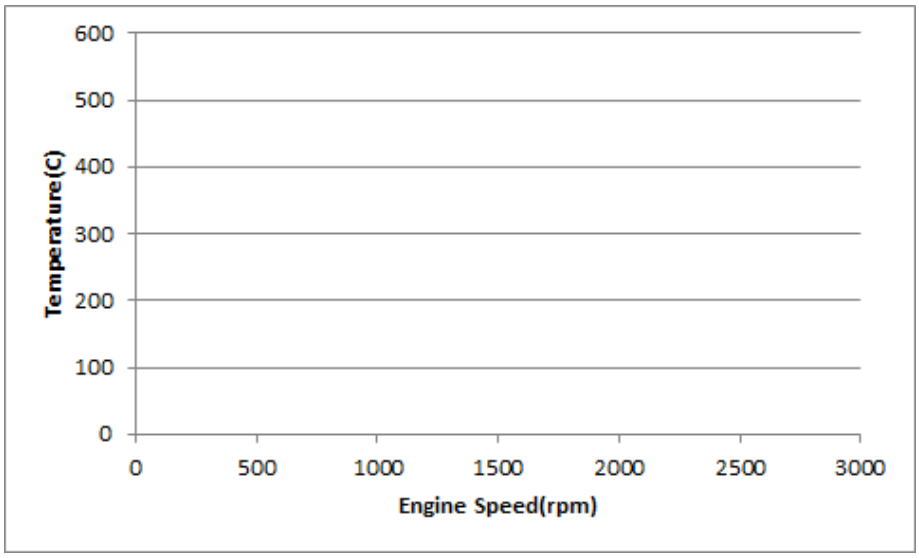


Figure 15- Temperature against speed

All right reserved by ASA company – confidential no passing to third parties.

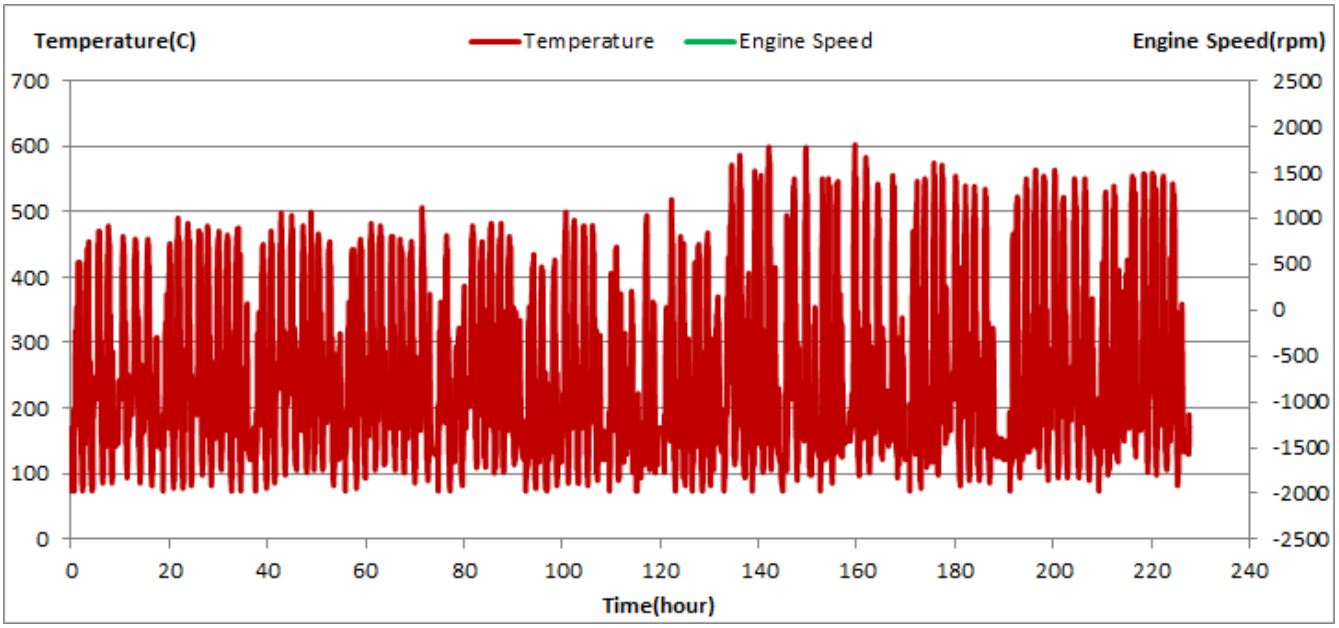


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 200 can't be observed and only 0.07% of working-time pressure is above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 11% of total working-time temperature is above 400 °C and 17% above 350°C. This high temperature distribution is cause of acceptable operation of this filter over the period.

❖ As mentioned above, engine speed sensor had problem in this period. Hence for calculating some data temperature's data used instead of engine speed's data (idling time for example).

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

All right reserved by ASA company – confidential no passing to third parties.

Address: Suite 10 | No. 25 | Nahal Alley | Koodak Square | Kashani Blvd |
Tehran – Iran | Postal Code 1474613714
Phone (+9821) 44360051-2 | Fax (+9821) 44360053
www.ASArvin.com | Info@asarvin.com