DPF FEASIBLITY STUDY REPORT

TEHRAN-IRAN

DPFs' Monthly Operation Report

Report Period: 01/Sep/2015 – 30/Sep/2015

Documents Numbers: DPF2015091/1, DPF215092/1

Contents:
Results Overview
Detailed Reports

Installed DPFs:

Vehicle ID	DPF Producer Company
78514 (line 4)	HJS_01 (Passive system with FBC)
85423 (line 4)	HJS _02 (Active system with FBC - Electrical Heater)
78515 (line 4)	Dinex_01 (Passive system with FBC)
78524 (line 4)	PURItech (Passive system with FBC)
33572 (line 2)	HJS_03 (Active system with FBC - Electrical Heater)
33637 (line 2)	Dinex_02(Passive system with FBC)
85476 (line 10)	HJS_04 (Passive system with FBC)
85182 (line 10)	Tehag_01 (Catalyzed DPF)

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

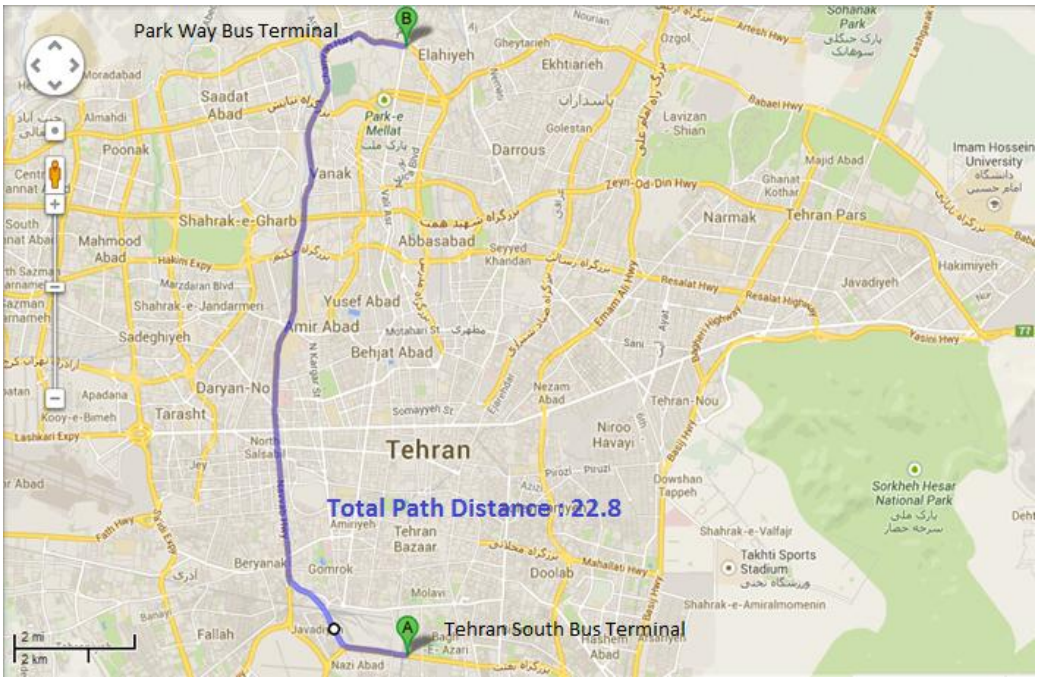
ASA AZMOON SANAT ARVIN	Documents Number: DPF2015091/1 DPF2015092/1

DPFs' Operation Results Overview

Vehicle ID	DPF Producer Company	Operation Status	Operation Status
		Sep/01/2015 - Seo/15/2015	Sep/16/2015 - Sep/30/2015
78514 (line 4)	HJS_01 (Passive system with FBC)	**1**	**1**
85423 (line 4)	HJS _02 (Active system with FBC - Electrical Heater)	**1**	**1**
78515 (line 4)	Dinex_01 (Passive system with FBC)	**2**	**2**
78524 (line 4)	PURItech (Passive system with FBC)	**2**	**3**
33572 (line 2)	HJS_03 (Active system with FBC - Electrical Heater)	**2**	**2**
33637 (line 2)	Dinex_02 (Passive system with FBC)	**3**	**5**
85476 (line 10)	HJS_04 (Passive system with FBC)	**2**	**2**
85182 (line 10)	Tehag_01 (Catalyzed DPF)	**1**	**1**

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

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



Overall Information

Table1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, Sim +989218355923
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value - DPF upstream	1.60 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	56321 km
Bus mileage over the period	2929 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	231 hours 34 minutes
Average working hours per day (including stop days)	15 hours 26 minutes
Bus average speed	12.65 km/hr
idle speed time to all working time ration	46.63 %
Total Bus fuel consumption over the period	1645 lit
Fuel consumption per hour	7.1 lit/hr
Average fuel consumption	0.56 lit/km
Total Bus additive consumption over the period	0.74 lit
Average additive consumption	252 cc/km
Additive consumption to fuel ration	450 cc/1000lit

Temperature, Pressure and Engine Speed Overview

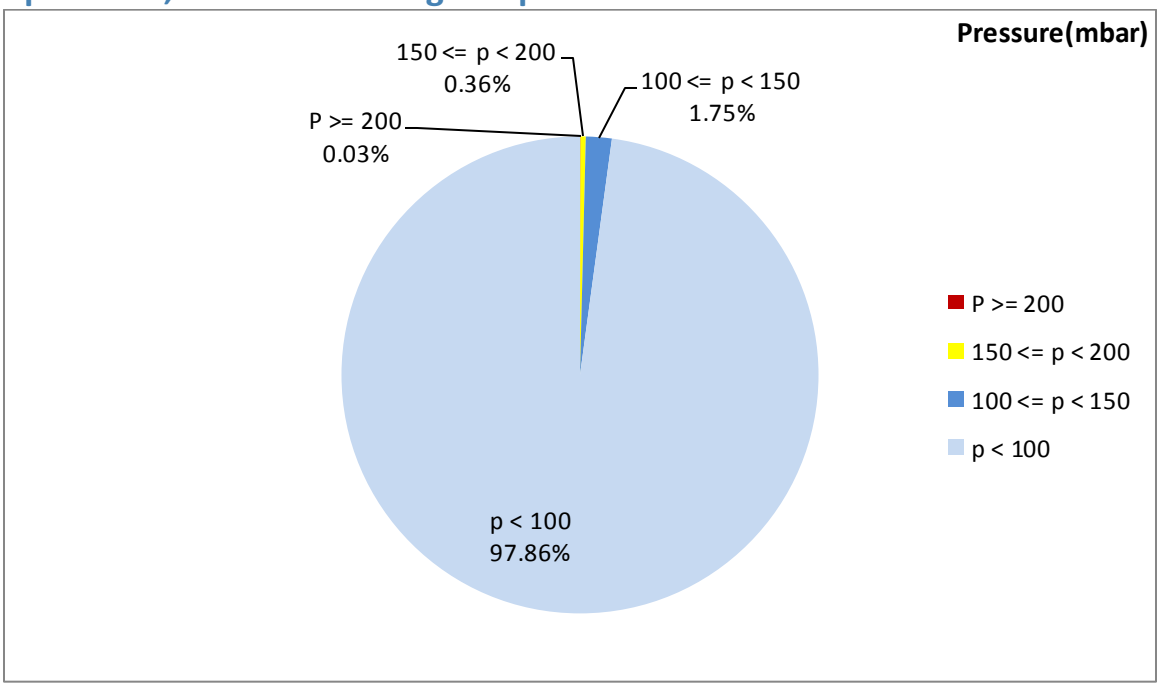


Figure 1- Pressure distribution over the working hours

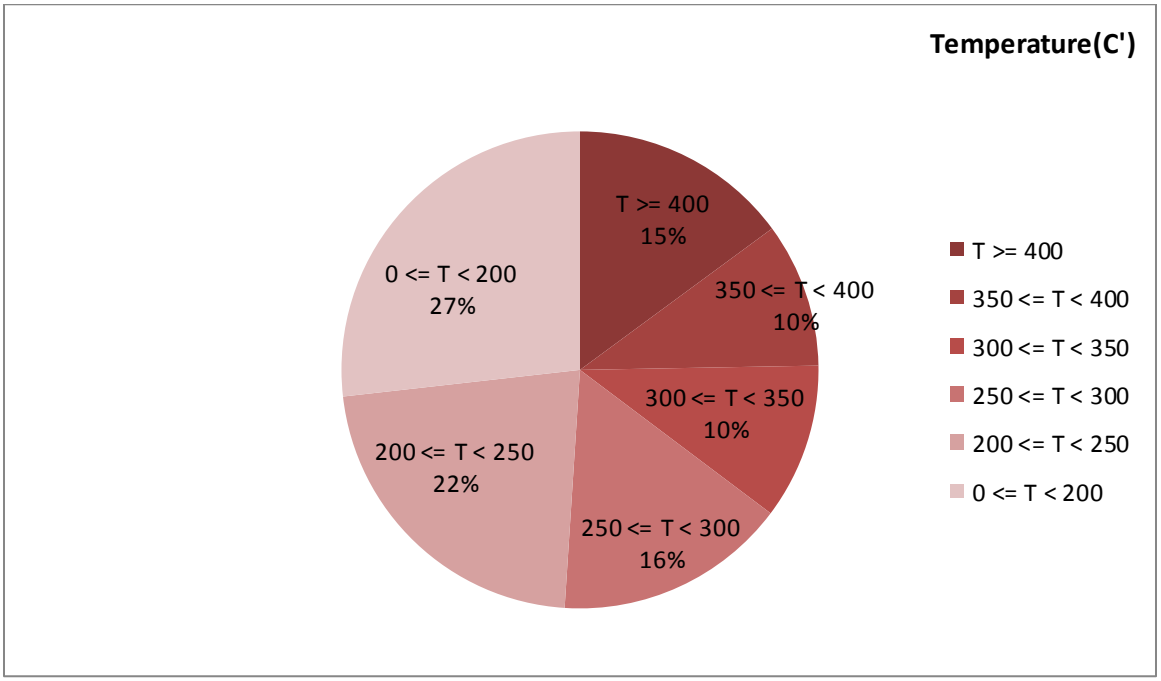


Figure 2-Temperature distribution over the working hours

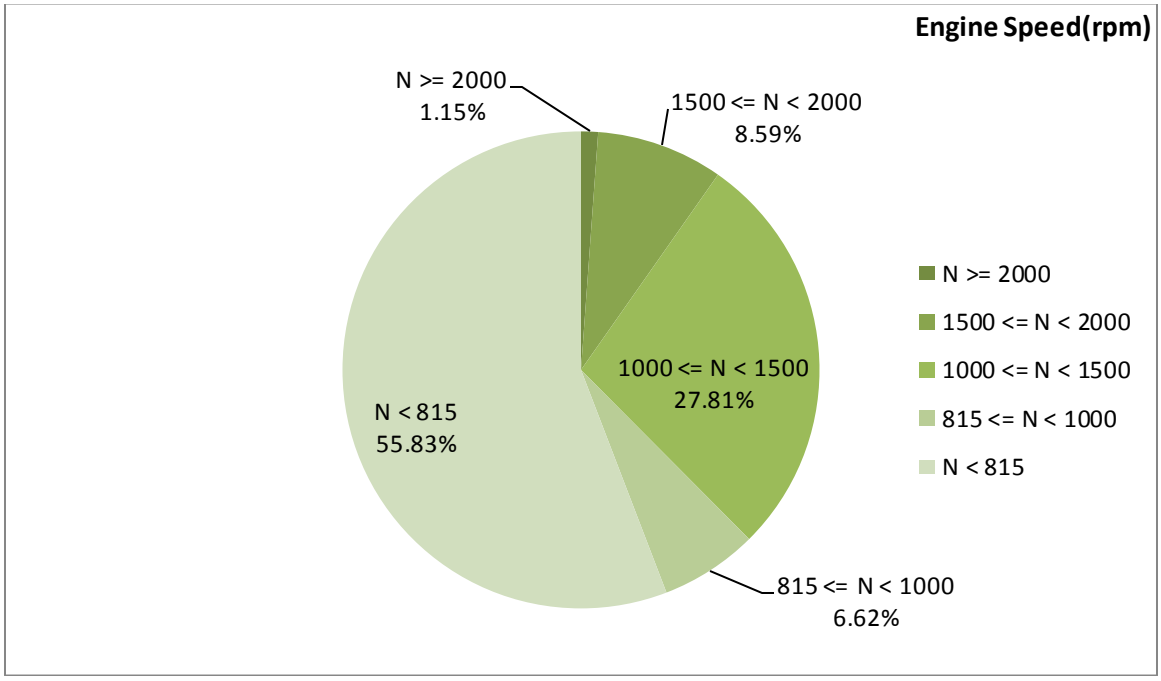


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
274.64	19.32	933

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
324.62	31.42	1191

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
582-50	243-0	2400-256

Detailed Pressure Analysis

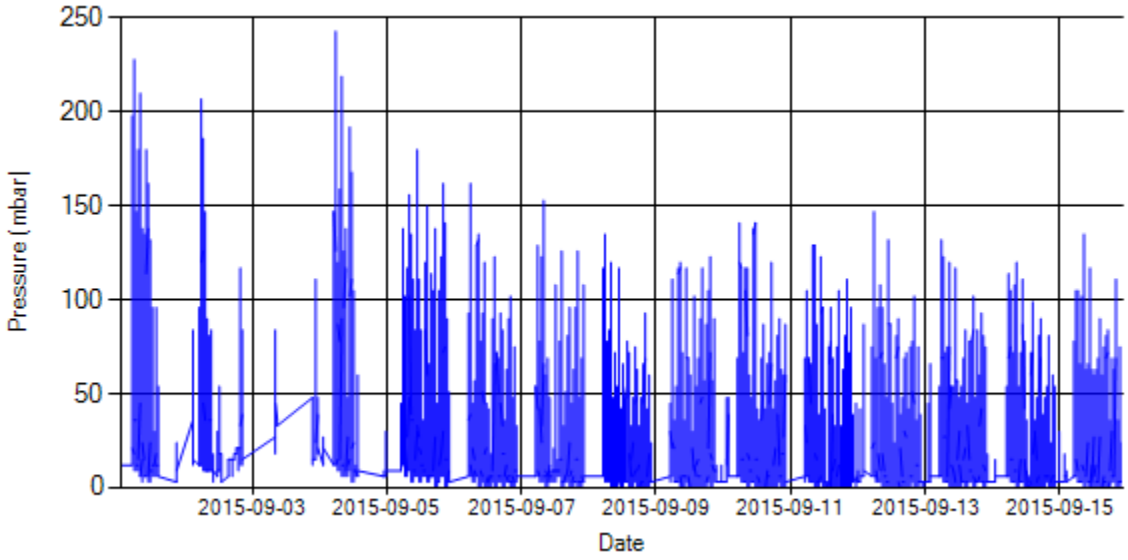


Figure 4- Pressure distribution over the period

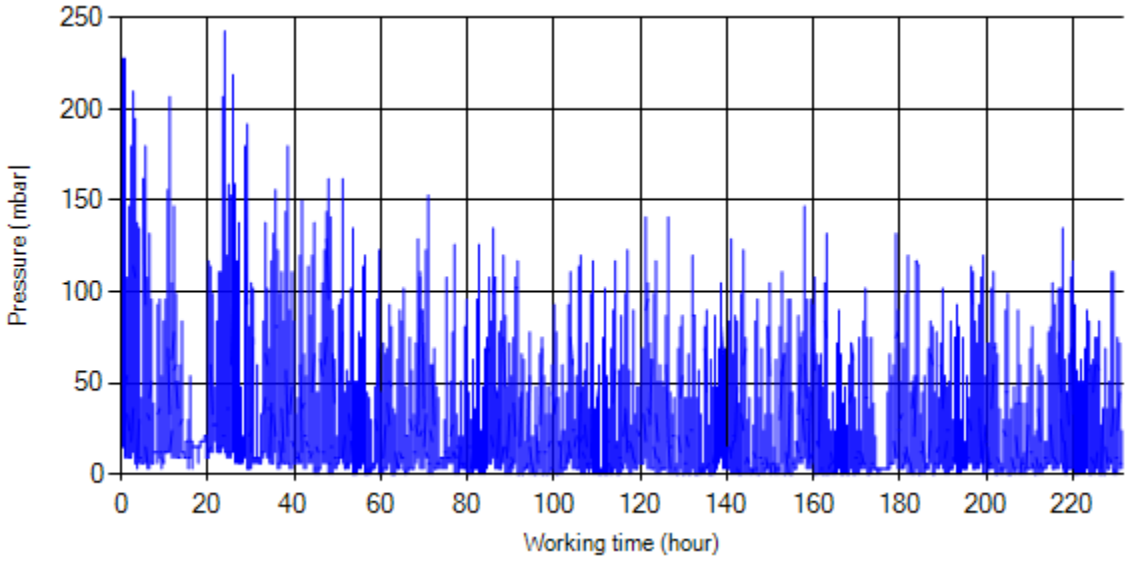


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

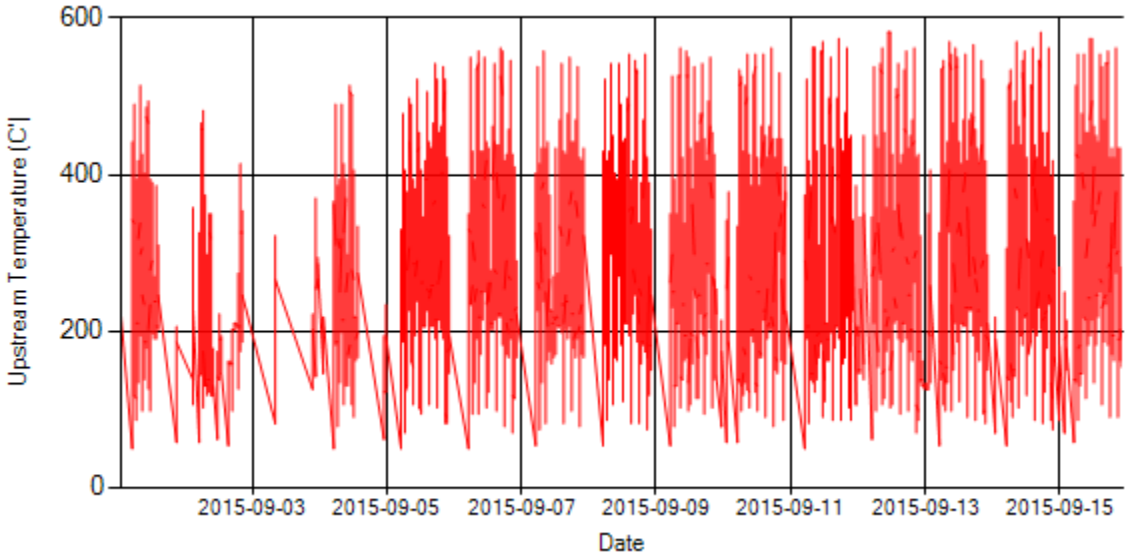


Figure 6- Temperature distribution over the period

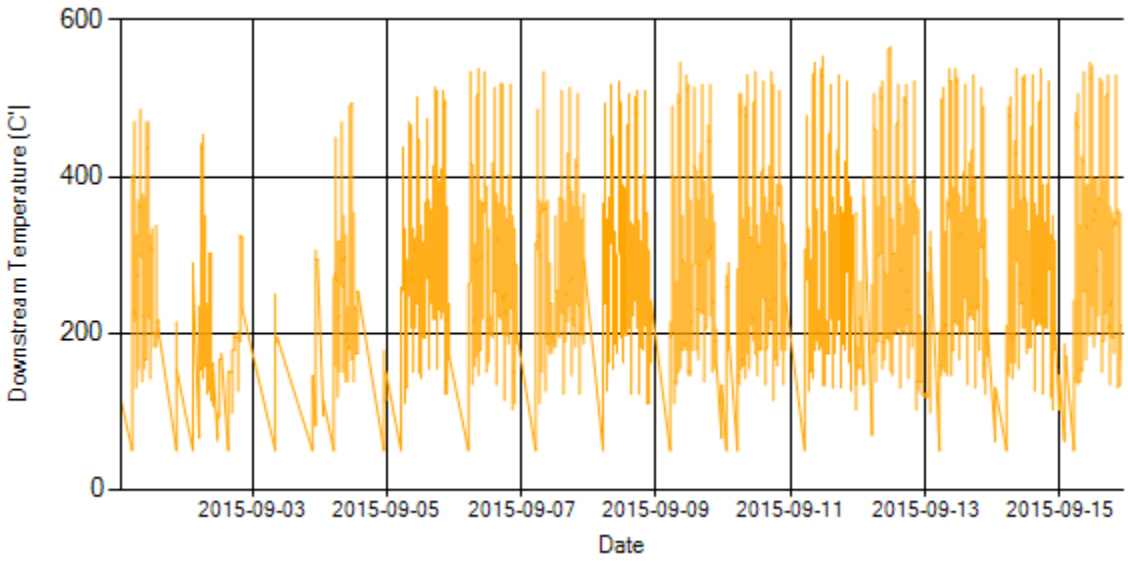


Figure 7- Temperature distribution over the period

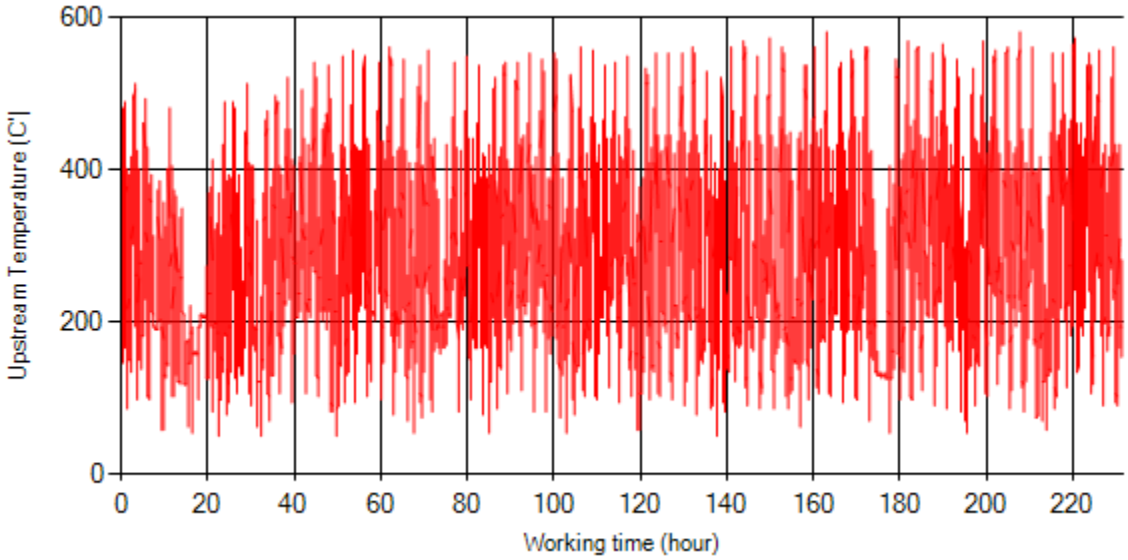


Figure 8- Temperature vs. working hours

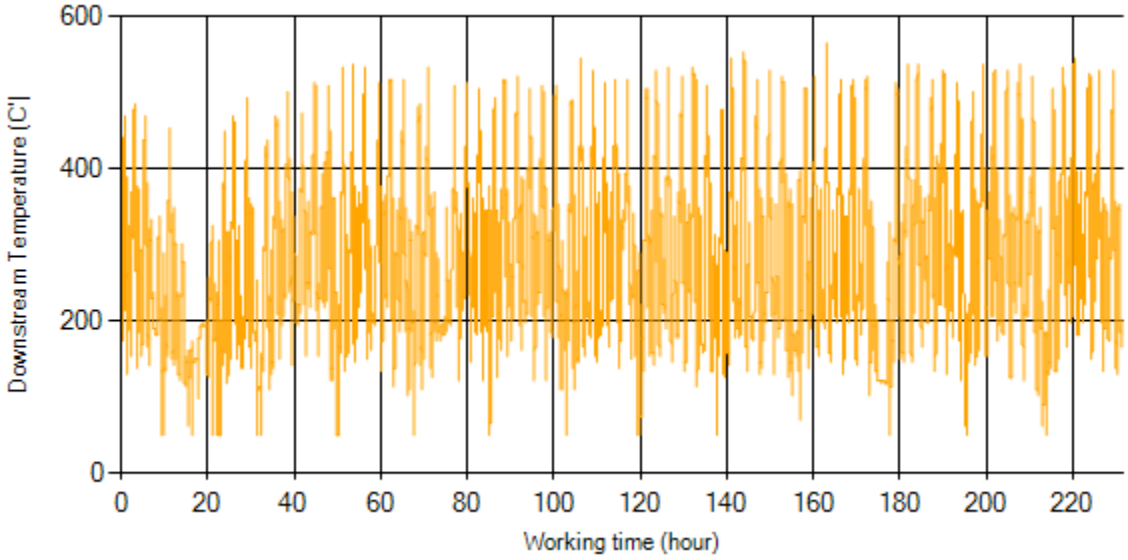


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

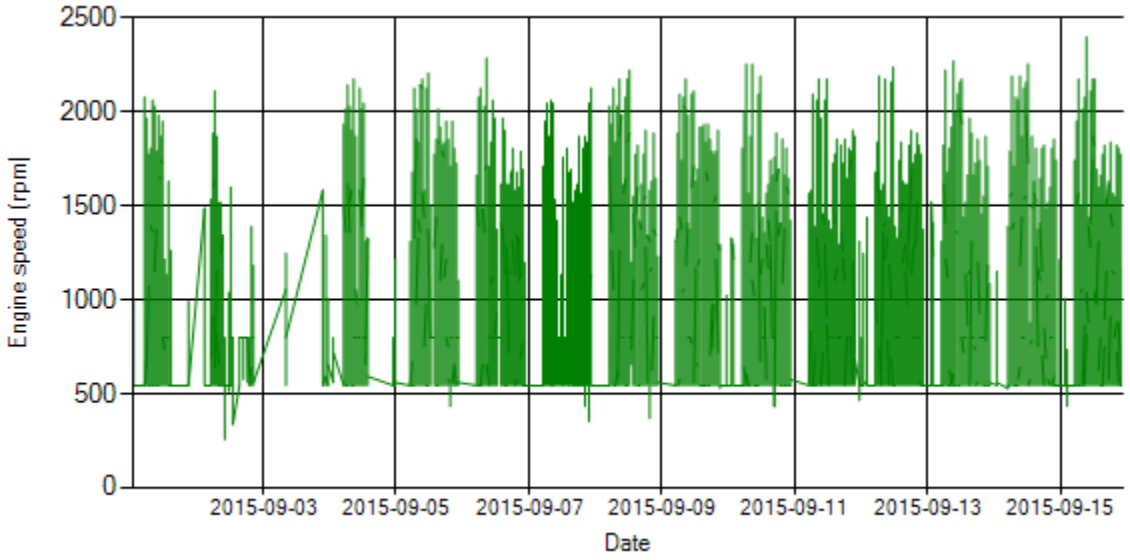


Figure 10- Engine speed distribution over the period

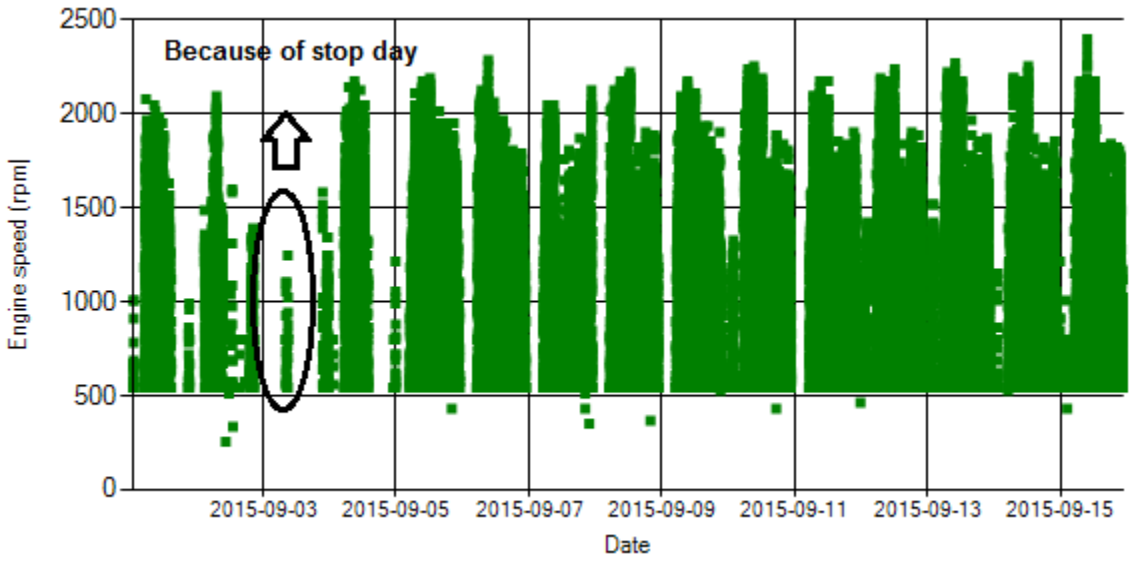


Figure 11- Engine speed diagram for calculating CPK's working days

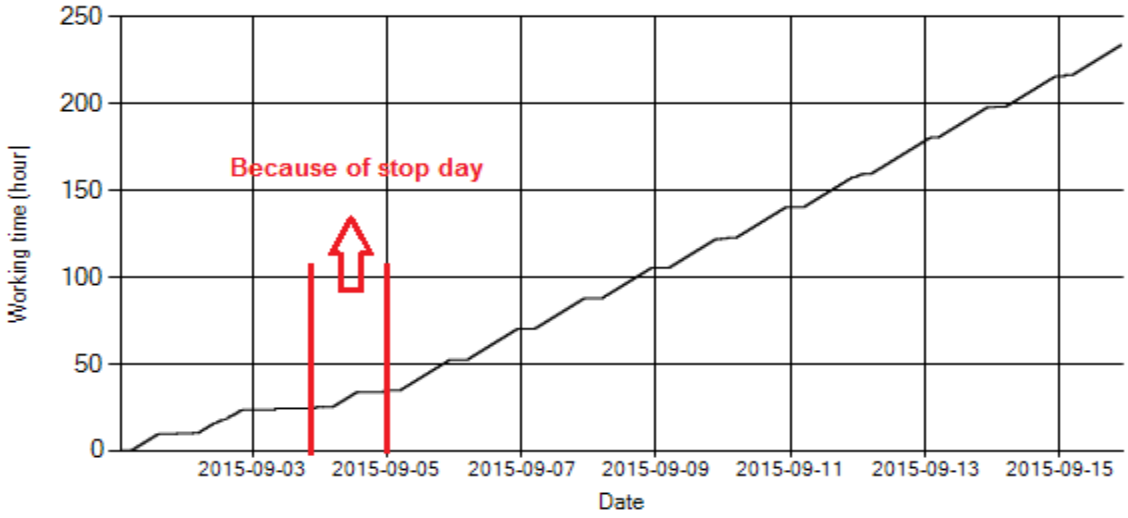


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

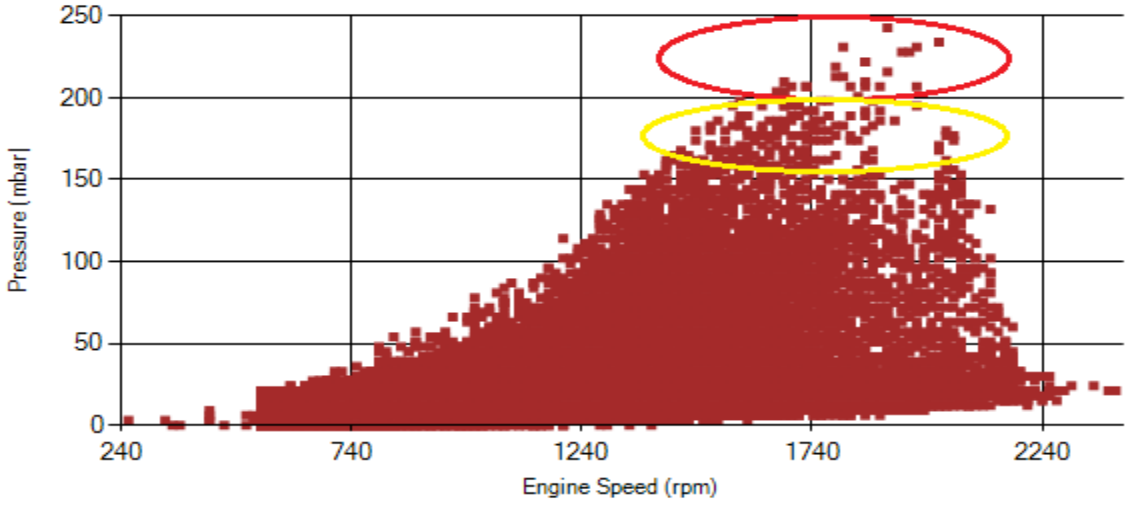


Figure 13- Pressure against engine speed

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

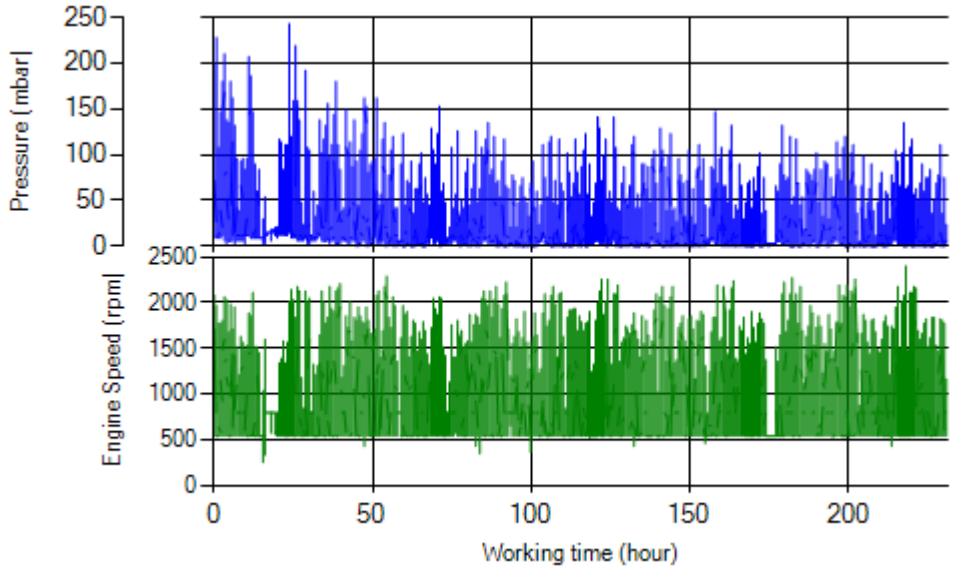


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

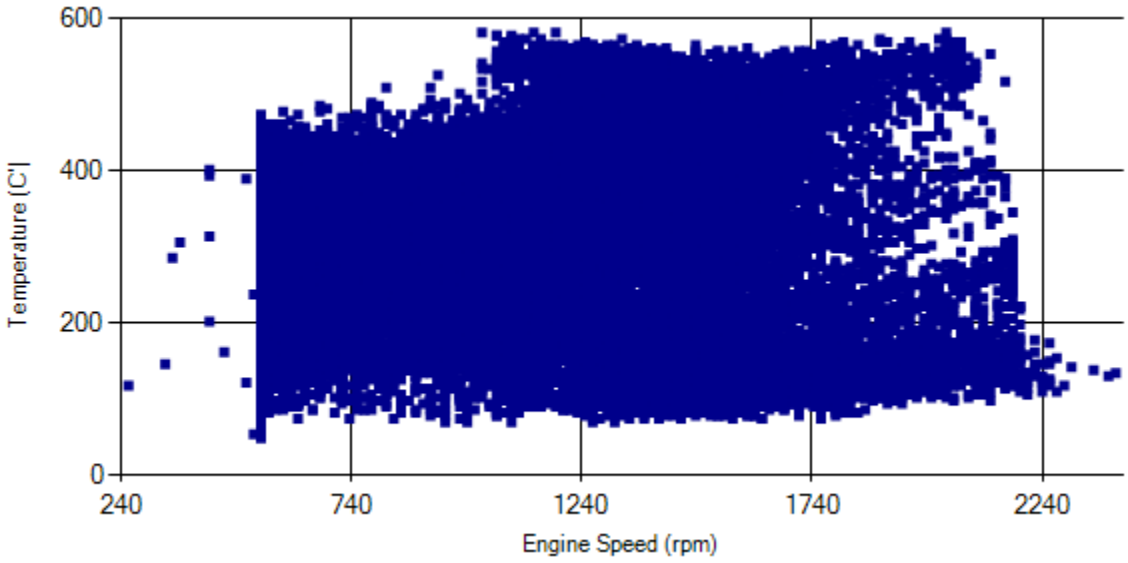


Figure 15- Temperature against engine speed

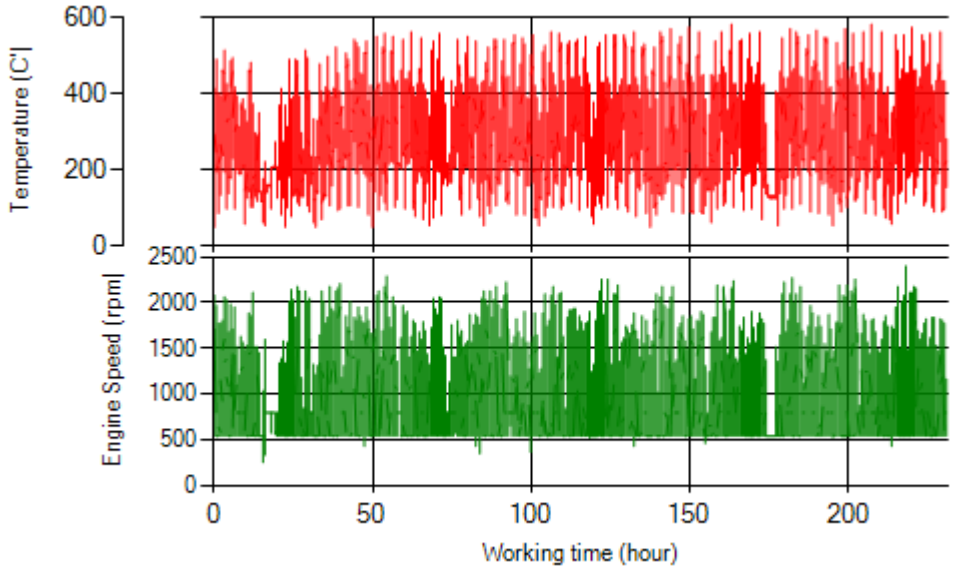


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, only 0.03% of total working time pressure is above 200 mbar and 0.39% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 15% of total working time temperature is above 400 °C and 25% above 350°C. This high temperature distribution is one of the important factors for filter excellent operation during the period.

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

Overall Information

Table1- Overall Information

Vehicle plate number	78514
CPK data logger number	LN: 001496, DN: 1914, Sim +989218355923
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	HJS_01 (Passive system with FBC)
Installation date	10/Sep/2014
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value - DPF upstream	1.60 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	59805 km
Bus mileage over the period	3484 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	184 hours 8 minutes
Average working hours per day (including stop days)	12 hours 16 minutes
Bus average speed	18.92 km/hr
idle speed time to all working time ration	50.47 %
Total Bus fuel consumption over the period	2089 lit
Fuel consumption per hour	11.34 lit/hr
Average fuel consumption	0.6 lit/km
Total Bus additive consumption over the period	0.9 lit
Average additive consumption	257 cc/km
Additive consumption to fuel ration	430 cc/1000lit

Temperature, Pressure and Engine Speed Overview

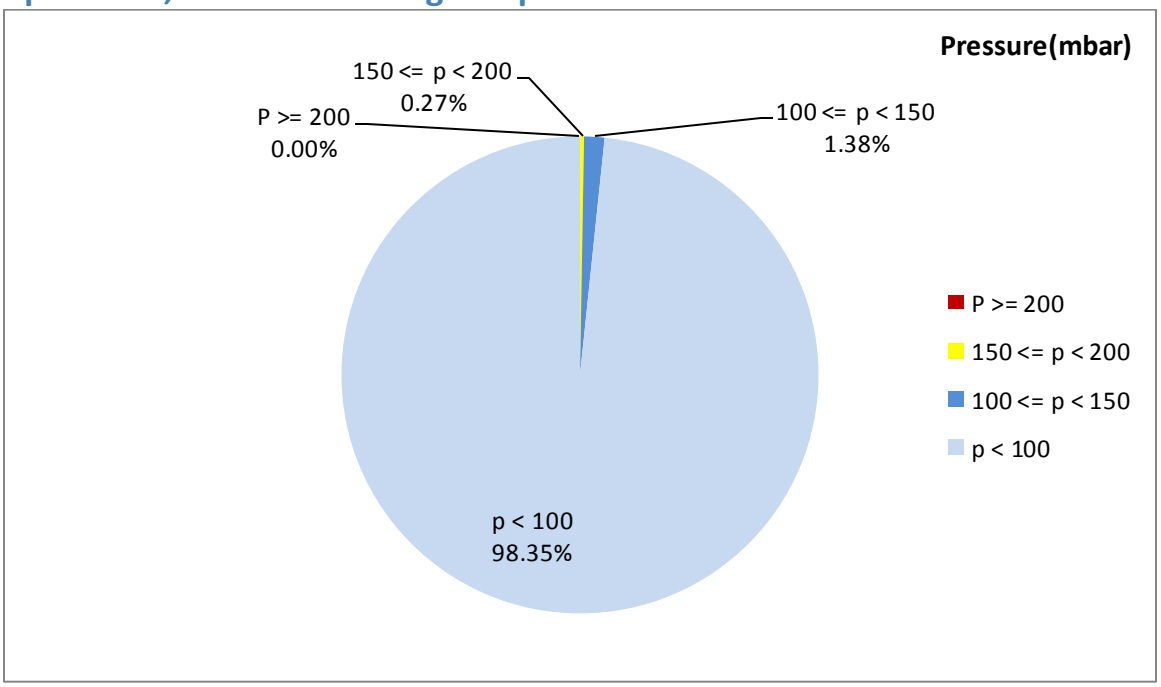


Figure 1- Pressure distribution over the working hours

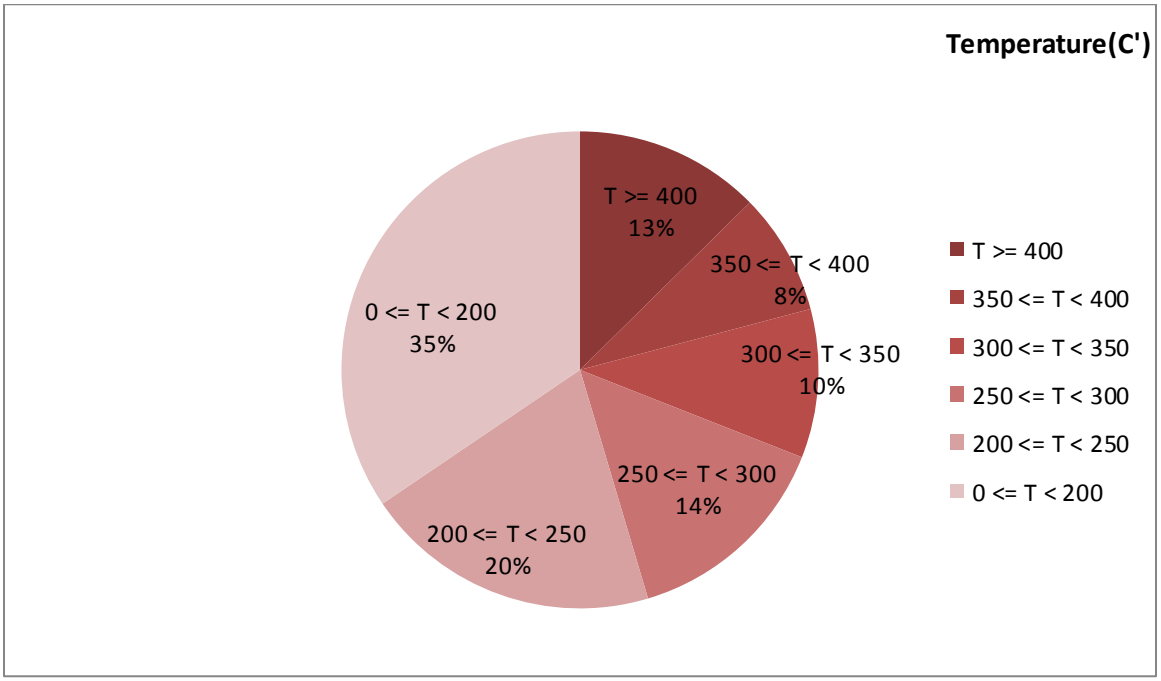


Figure 2-Temperature distribution over the working hours

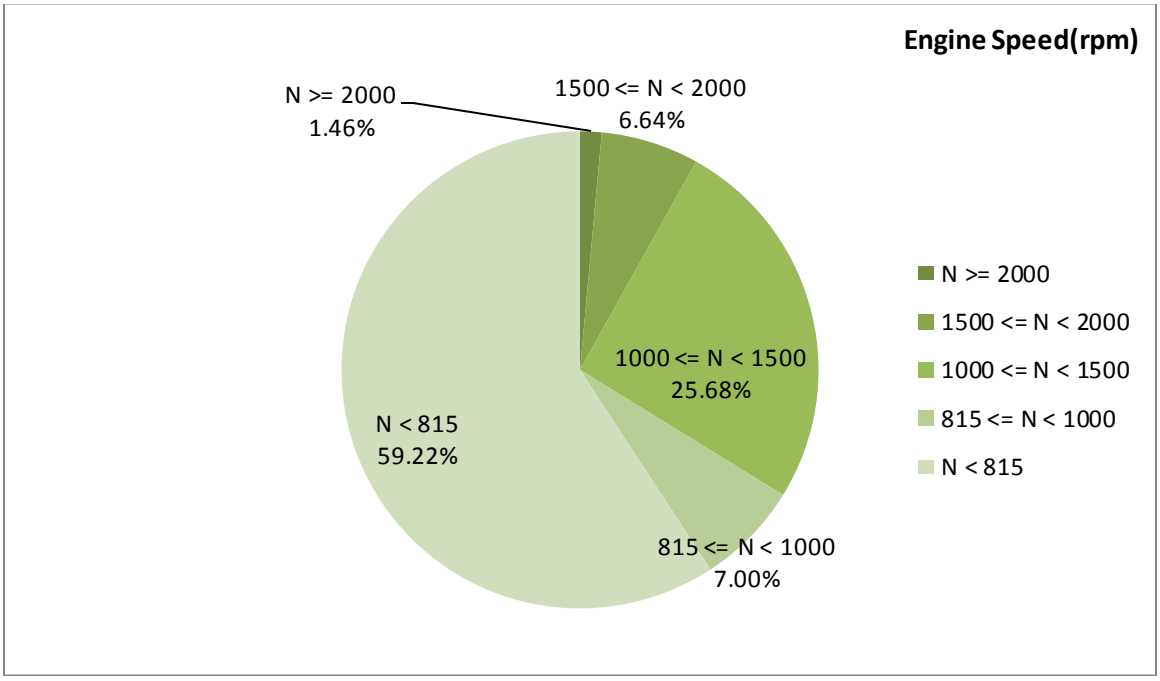


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
259.96	17.39	877

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
318.36	29.49	1171

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
618-50	210-0	2352-256

Detailed Pressure Analysis

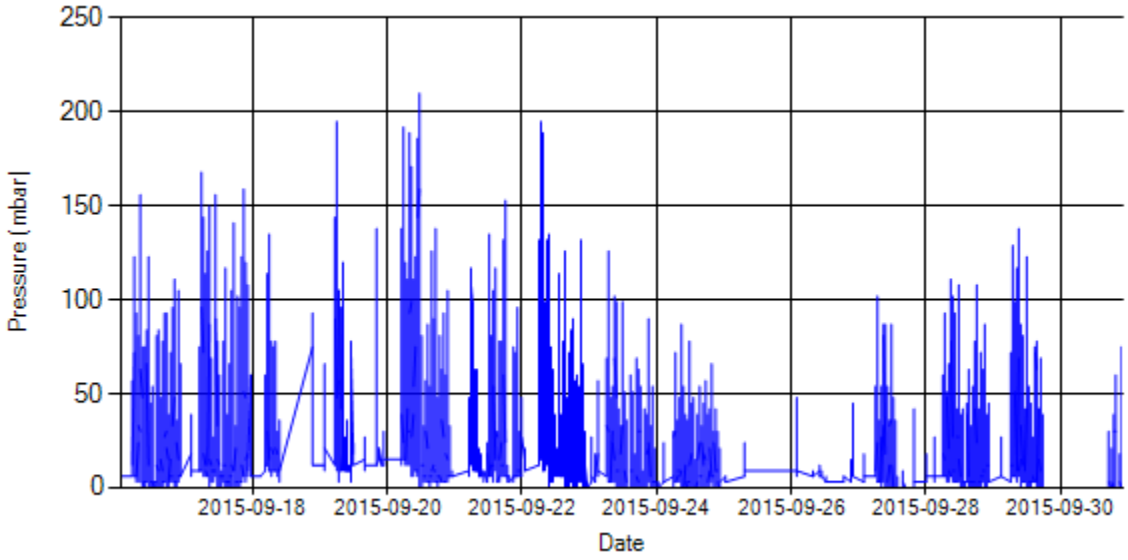


Figure 4- Pressure distribution over the period

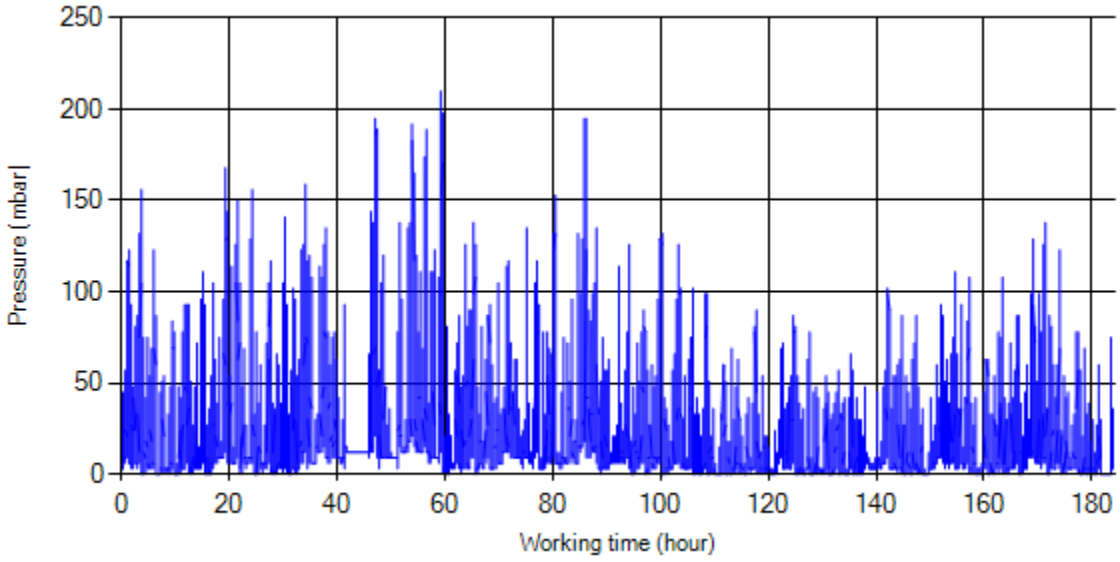


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

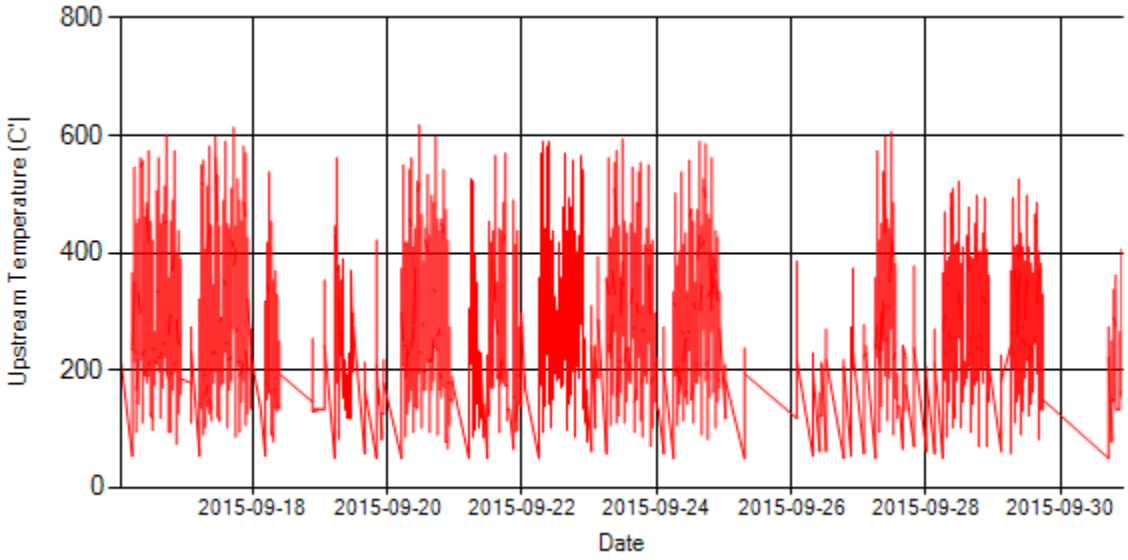


Figure 6- Temperature distribution over the period

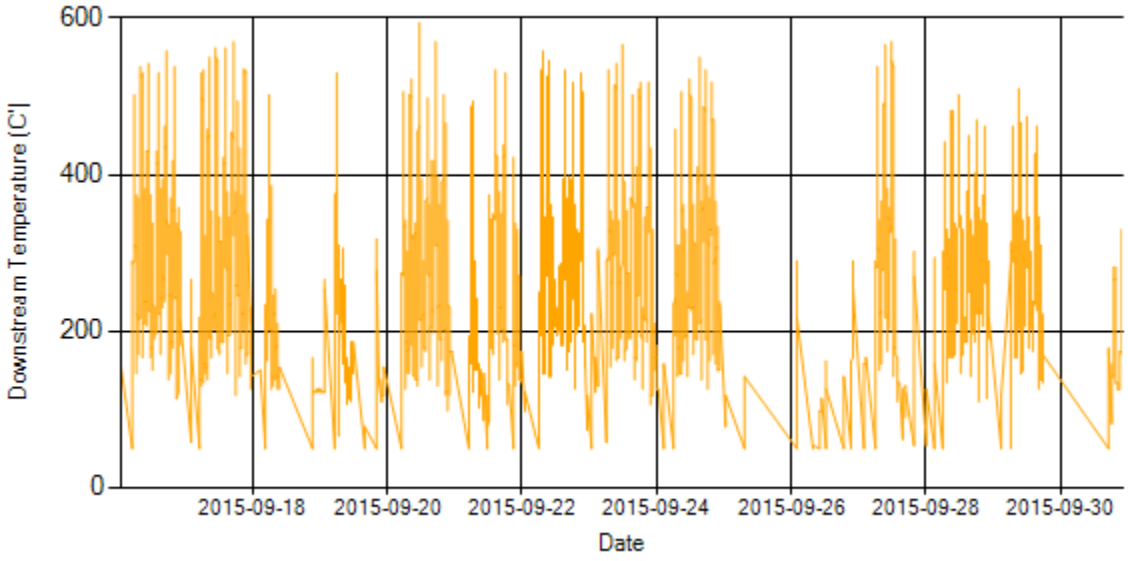


Figure 7- Temperature distribution over the period

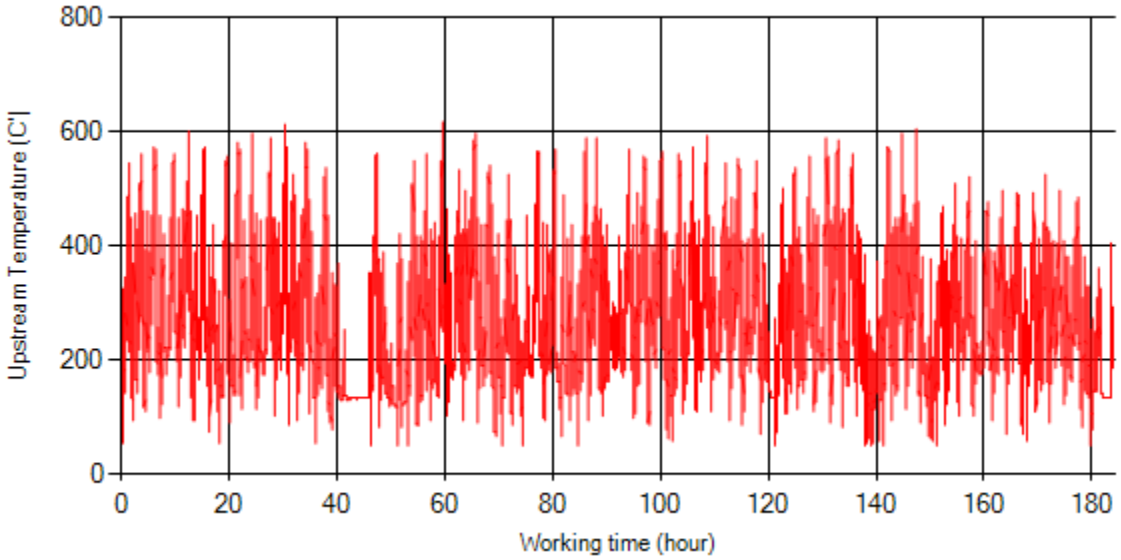


Figure 8- Temperature vs. working hours

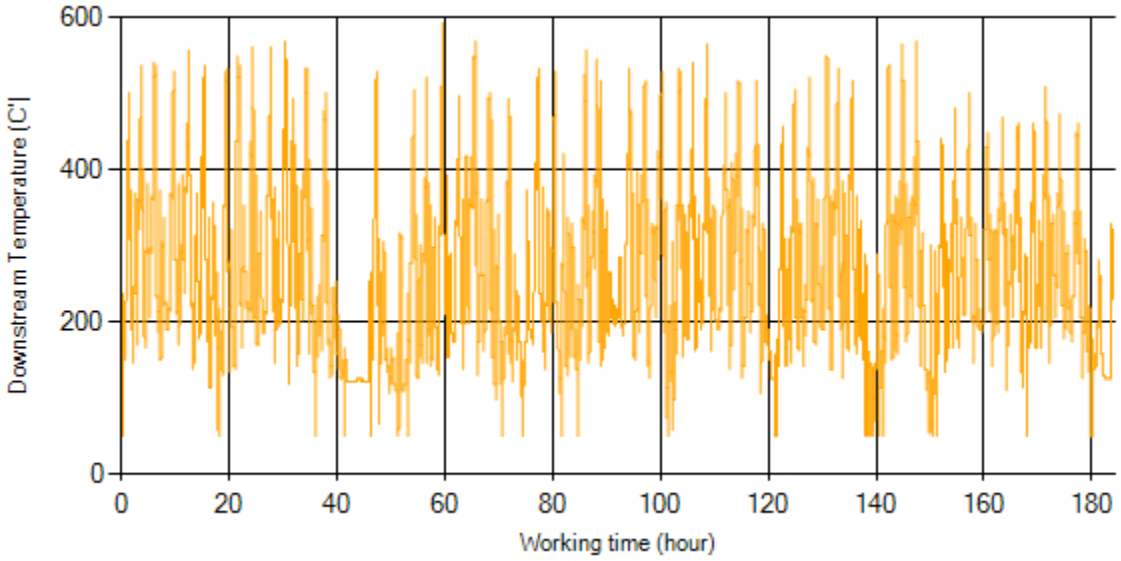


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

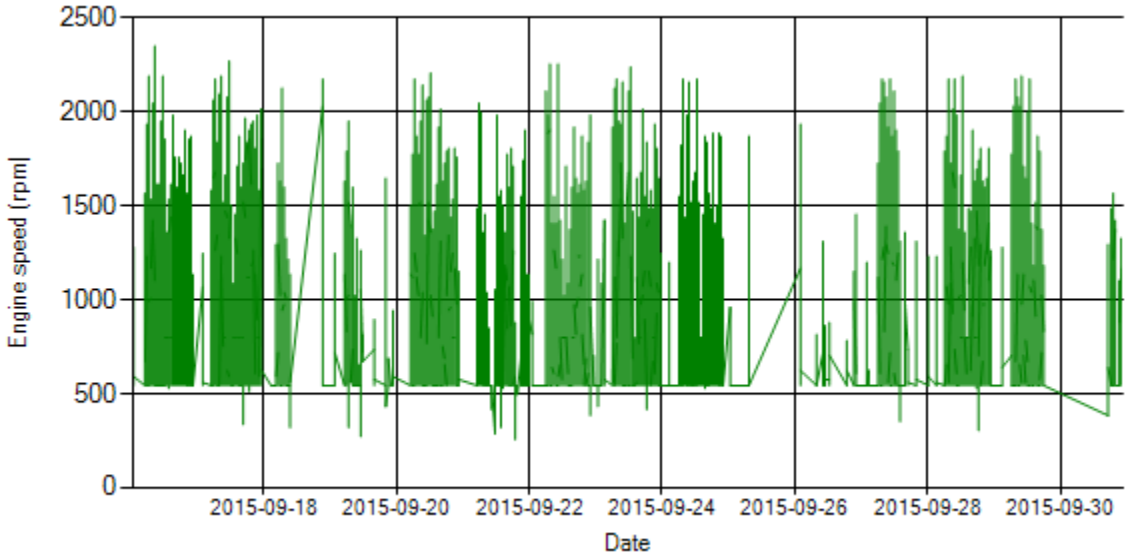


Figure 10- Engine speed distribution over the period

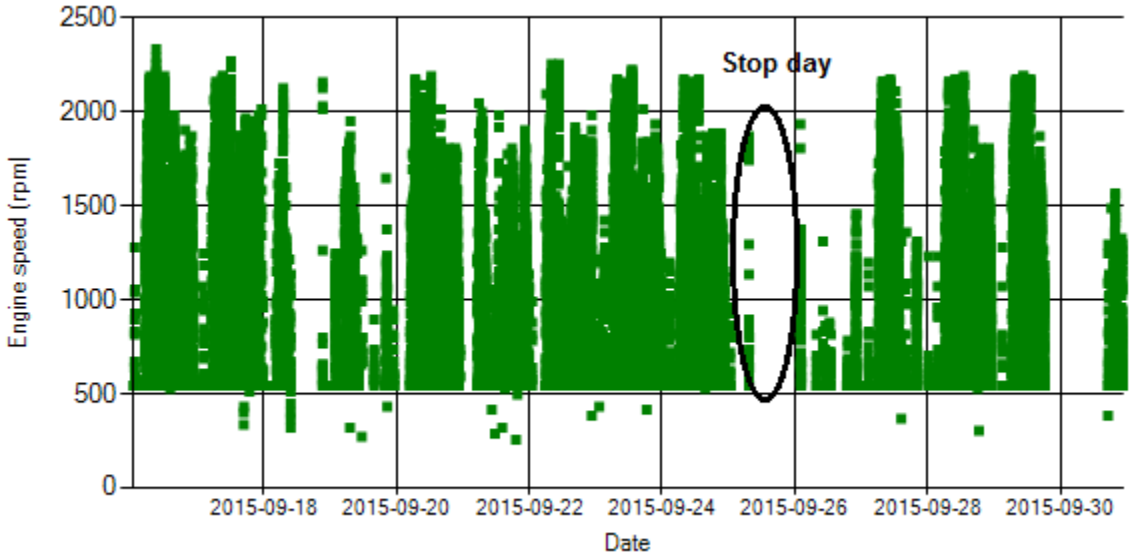


Figure 11- Engine speed diagram for calculating CPK's working days

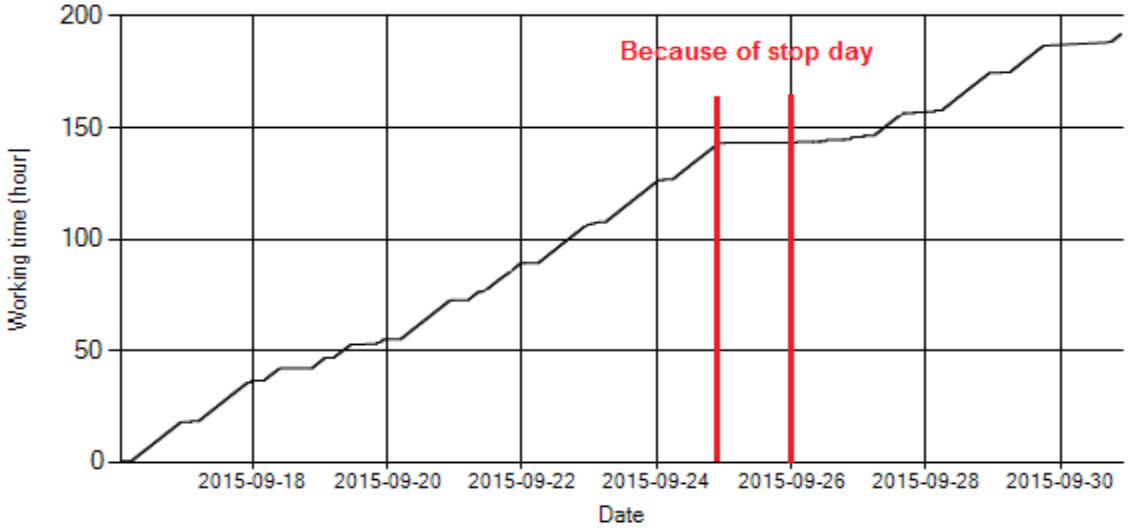


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

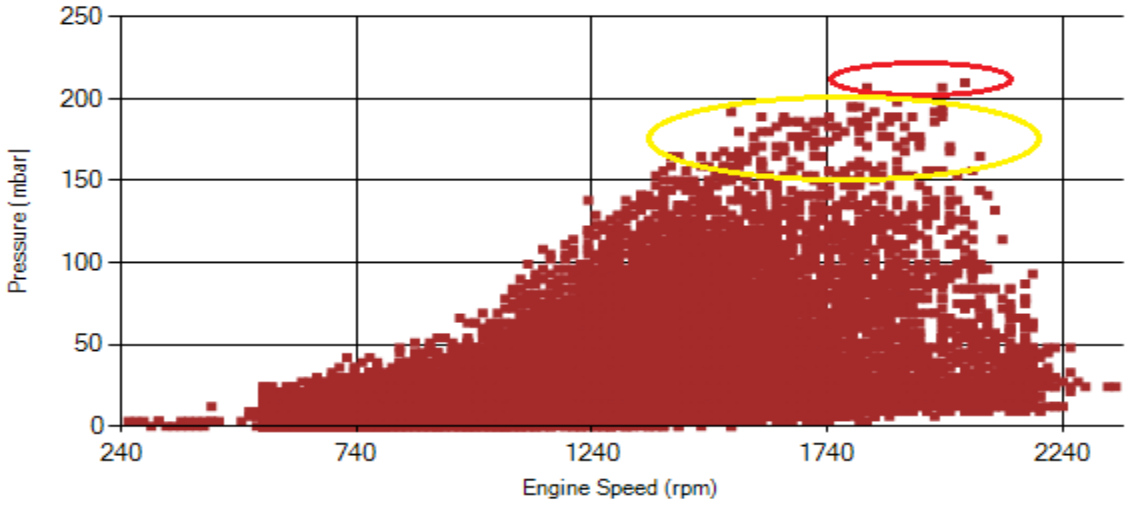


Figure 13- Pressure against engine speed

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

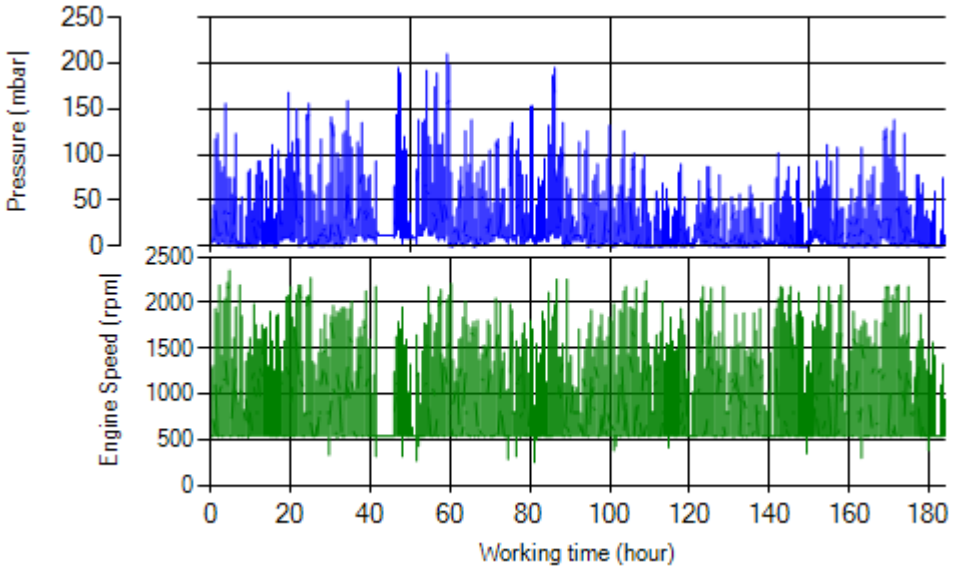


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

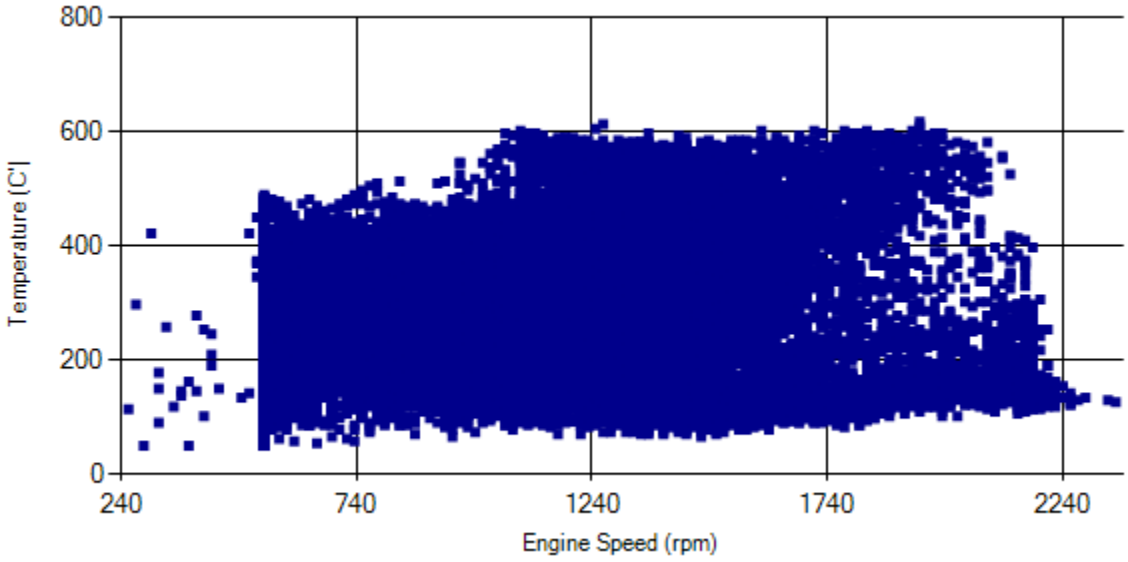


Figure 15- Temperature against engine speed

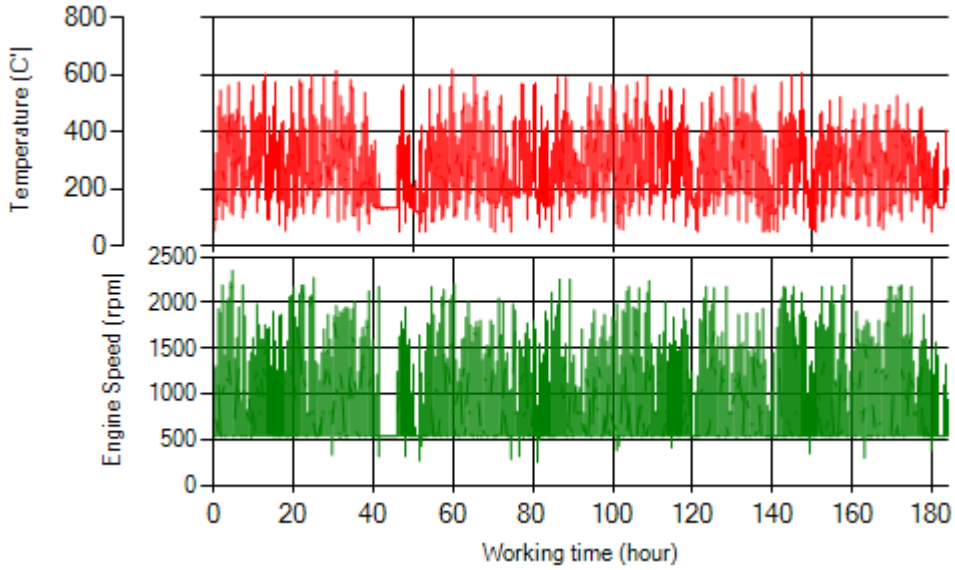


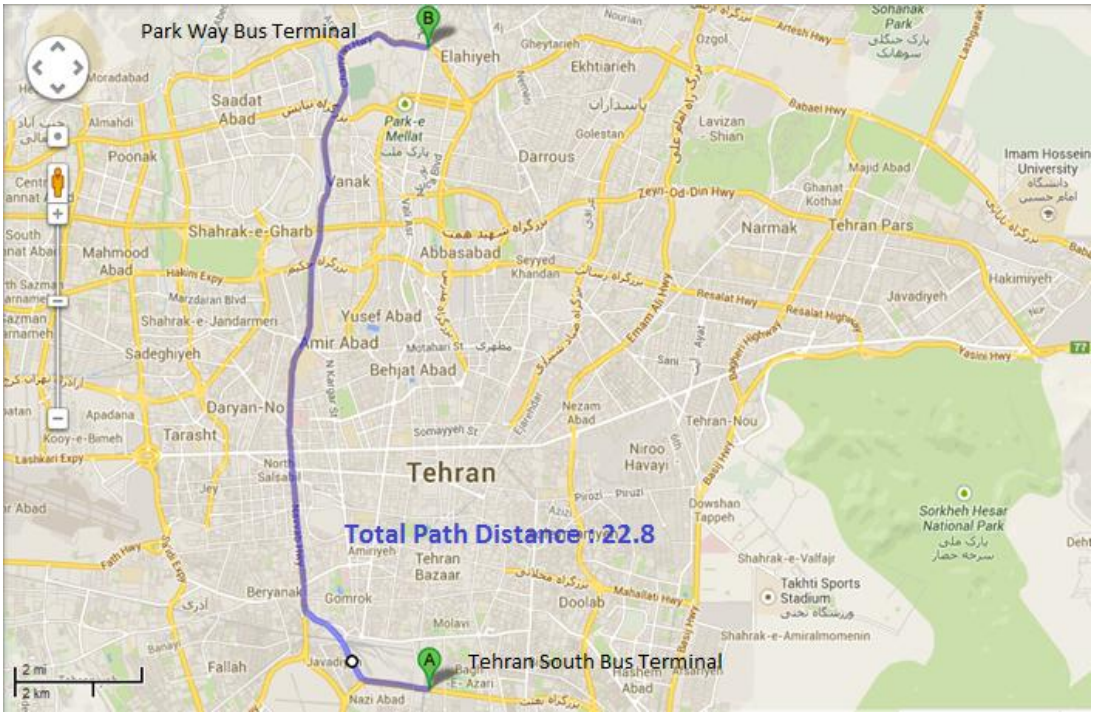
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in Figure 1, pressure above 200 couldn't be observed and only 0.27% of total working time preesure is above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 13% of total working time temperature is above 400 °C and 21% above 350°C. This high temperature distribution is one of the important factors for filter excellent operation during the period.

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

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



Overall Information

Table1- Overall Information

Vehicle plate number	85423
CPK data logger number	LN: 001505, DN: 2001, Sim Number +989218469621
Bus line	Number 4 (south to north bus line)
Bus Terminals	South Bus Terminal - Park Way Bus Tehran Terminal
Total path distance	22.8 km
DPF producer company	HJS_02 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	01/Sep/2015- 15/Sep/2015 (fifteen days)
K value - DPF upstream	1.78 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	33957 km
Bus mileage over the period	2140 km
Working days over the period	11 days
Stop days	4 days
Data logger working days	11 days
Working hours over the period	157 hours 23 minutes
Average working hours per day (including stop days)	10 hours 29 minutes
Bus average speed	13.6 km/hr
idle speed time to all working time ration	52.4 %
Total Bus fuel consumption over the period	1306 lit
Fuel consumption per hour	8.3 lit/hr
Average fuel consumption	0.61 lit/km
Total Bus additive consumption over the period	0.650 lit
Average additive consumption	305 cc/km
Additive consumption to fuel ration	500 cc per 1000 lit (batch dosing with tank level)

Temperature, Pressure and Engine Speed Overview

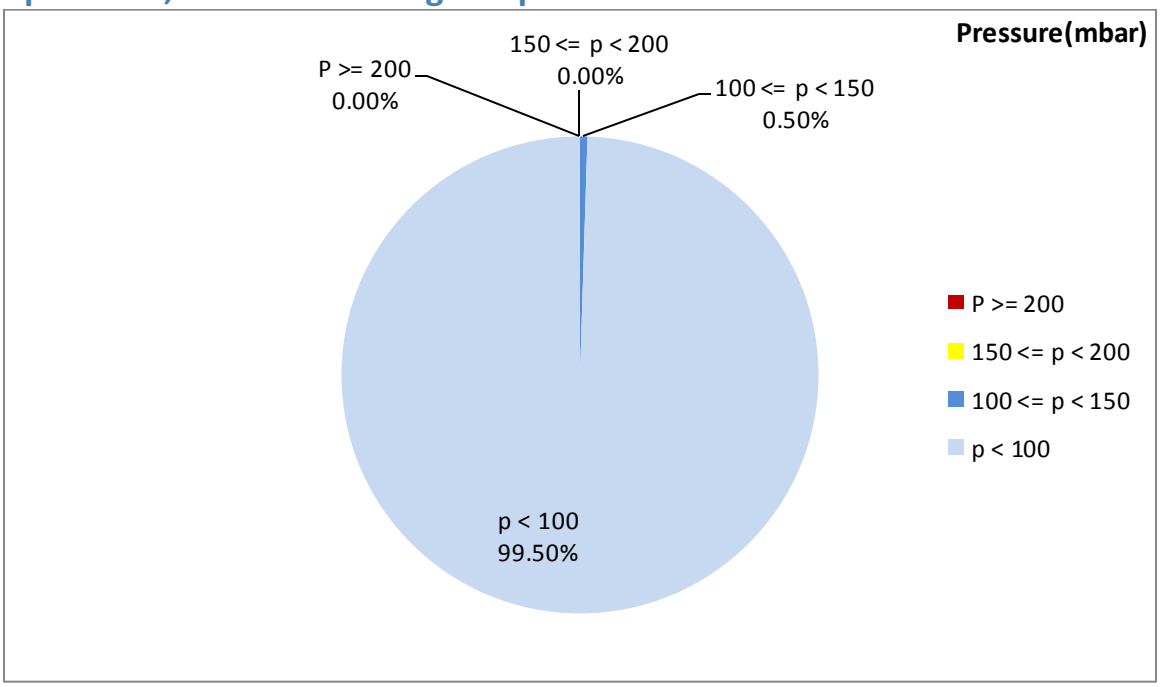


Figure 1- Pressure distribution over the working hours

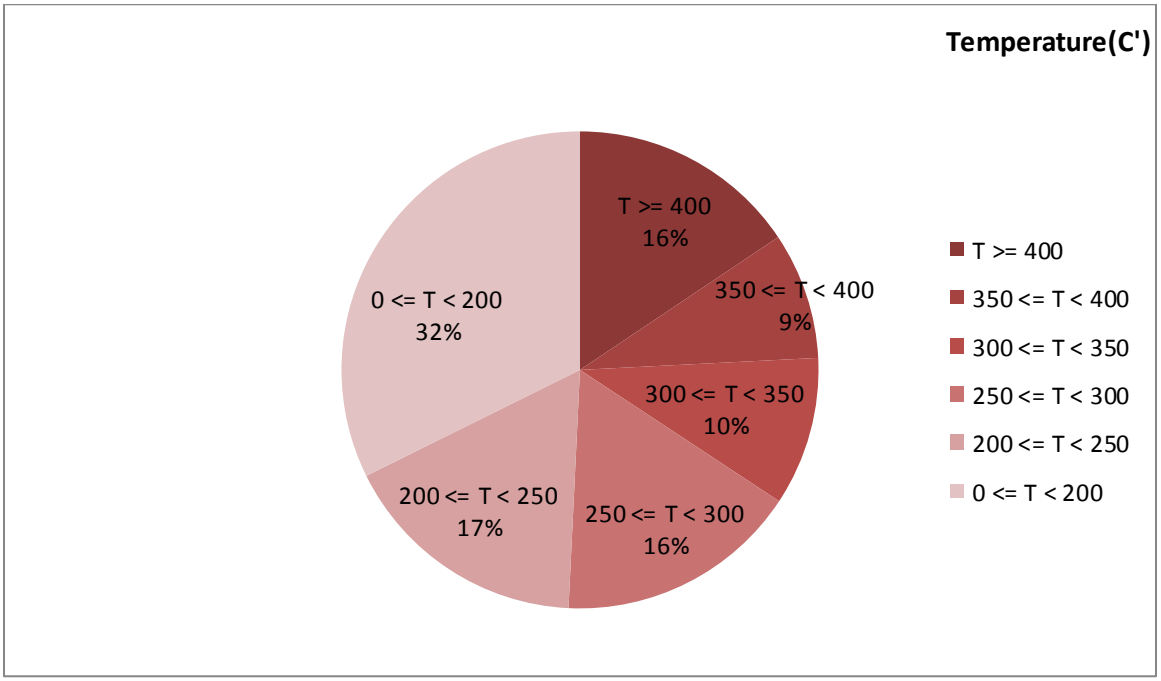


Figure 2-Temperature distribution over the working hours

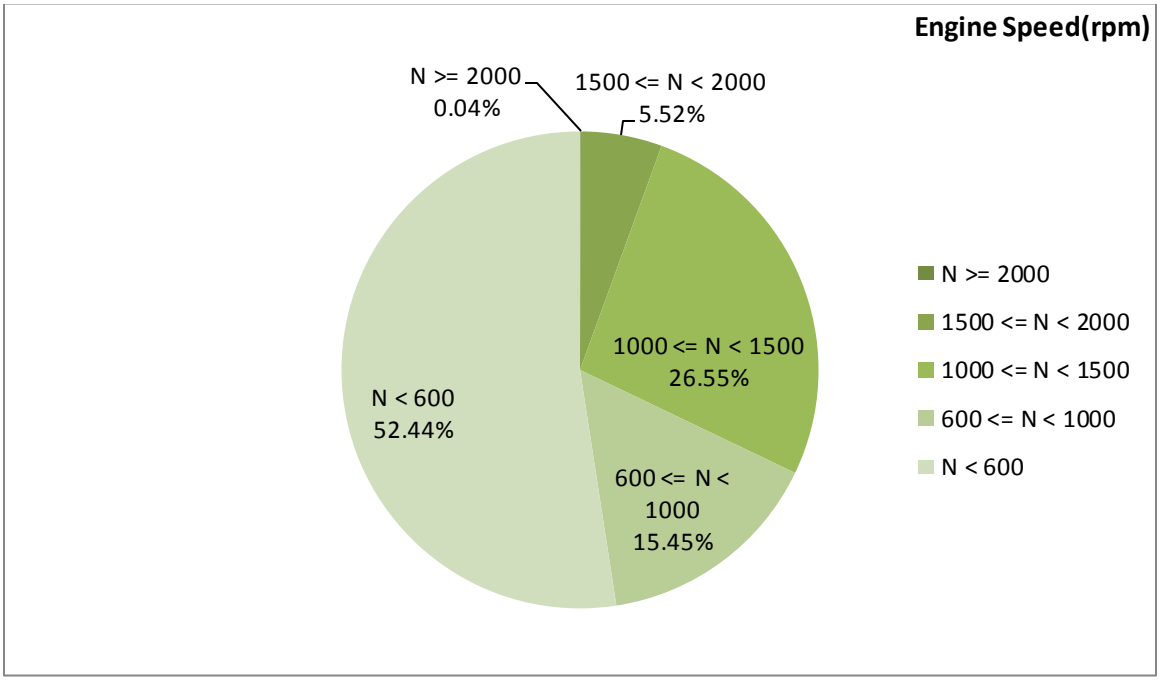


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
273.09	12.3	826

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
341.27	24.42	1135

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
674-50	135-0	2112-256

Detailed Pressure Analysis

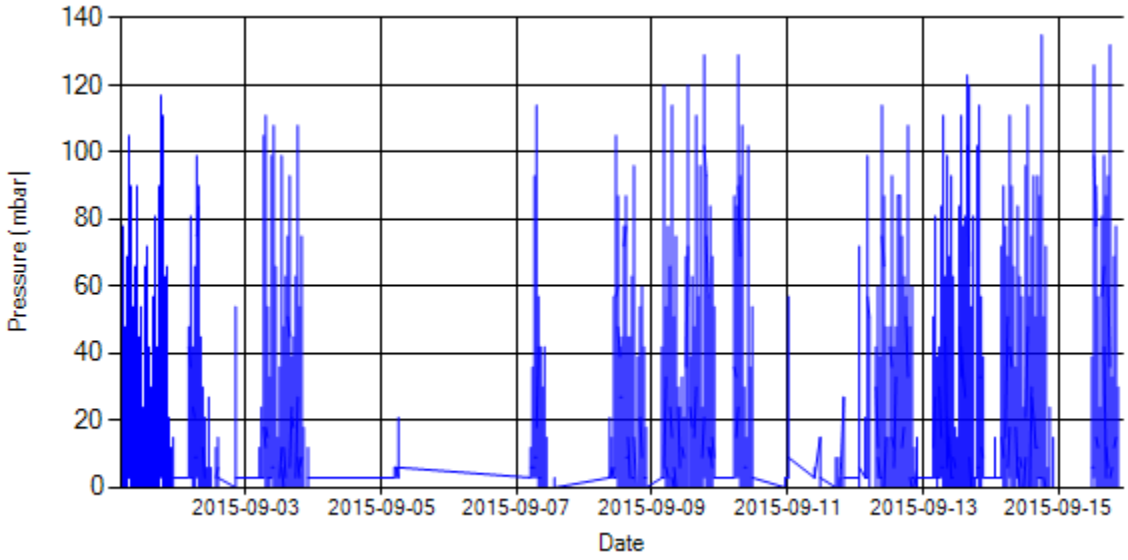


Figure 4- Pressure distribution over the period

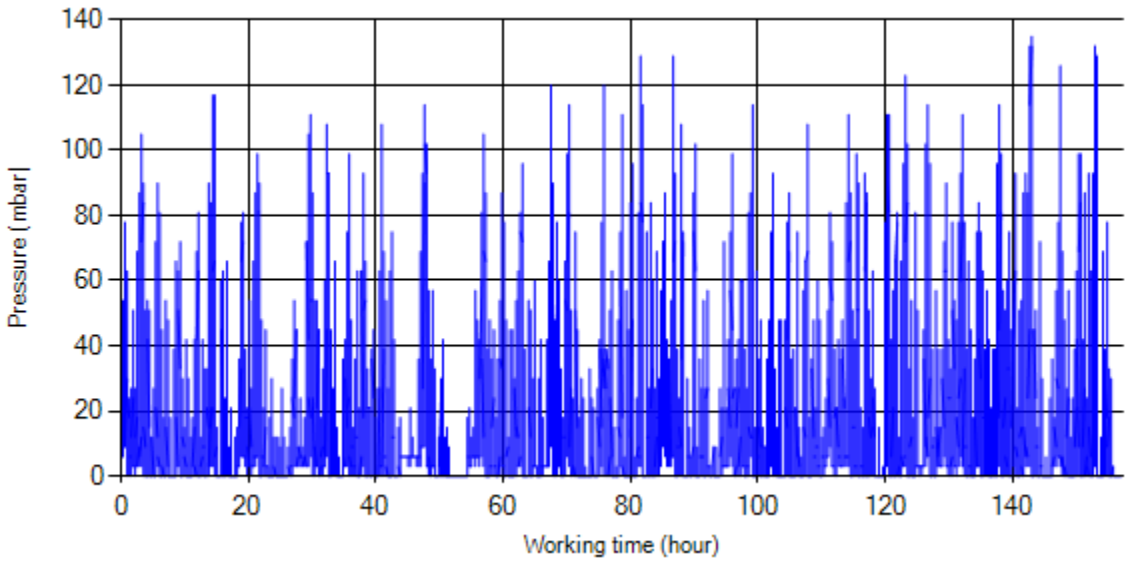


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

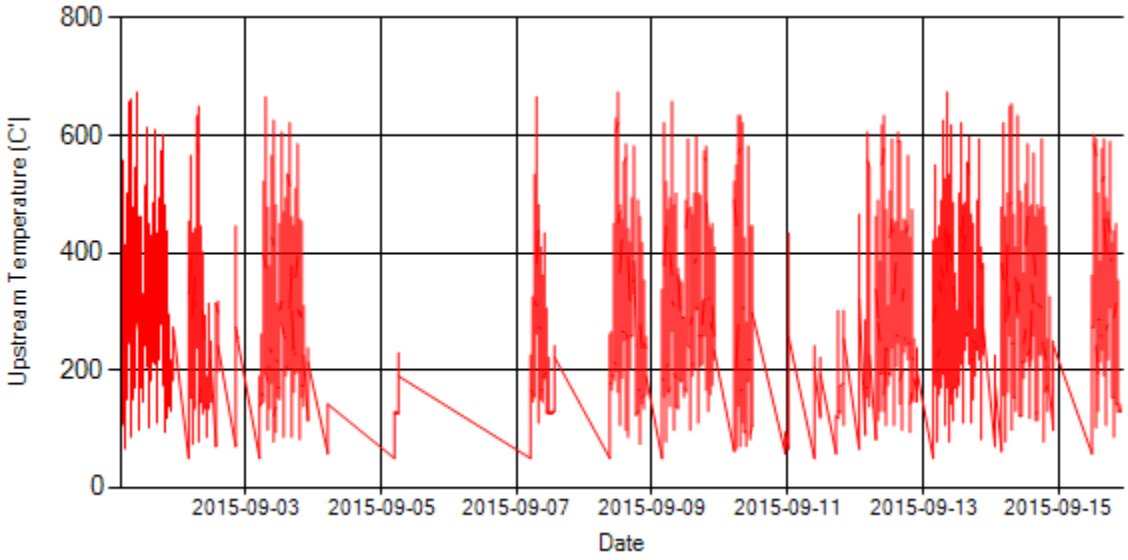


Figure 6- Temperature distribution over the period

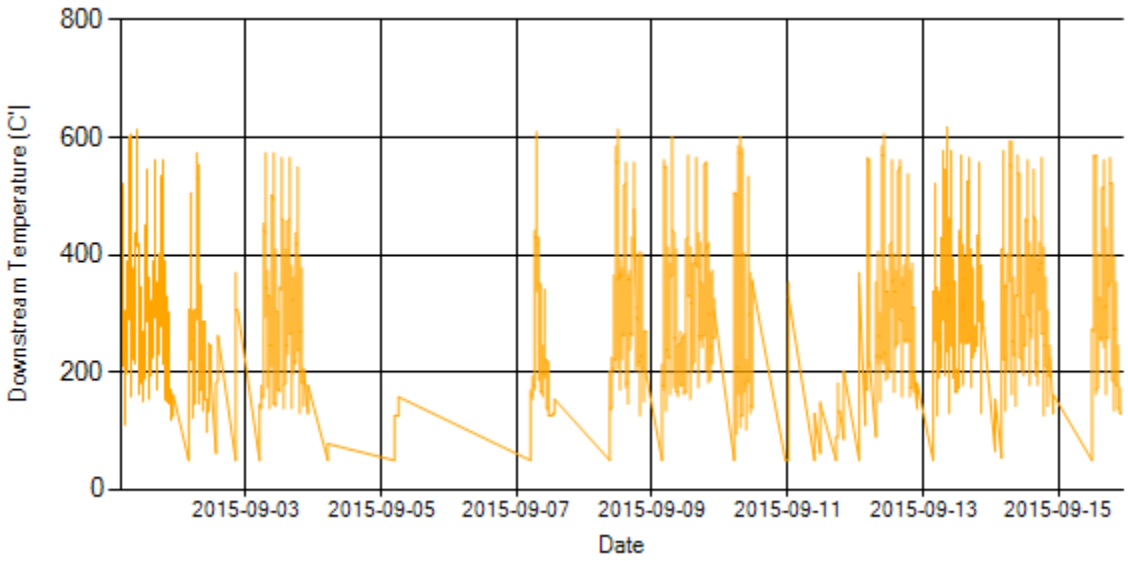


Figure 7- Temperature distribution over the period

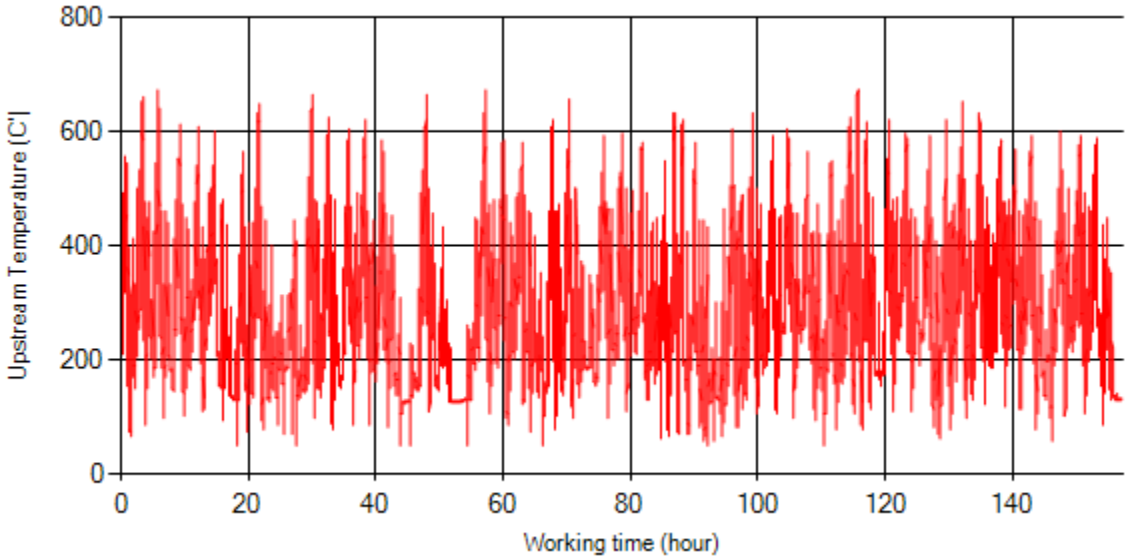


Figure 8- Temperature vs. working hours

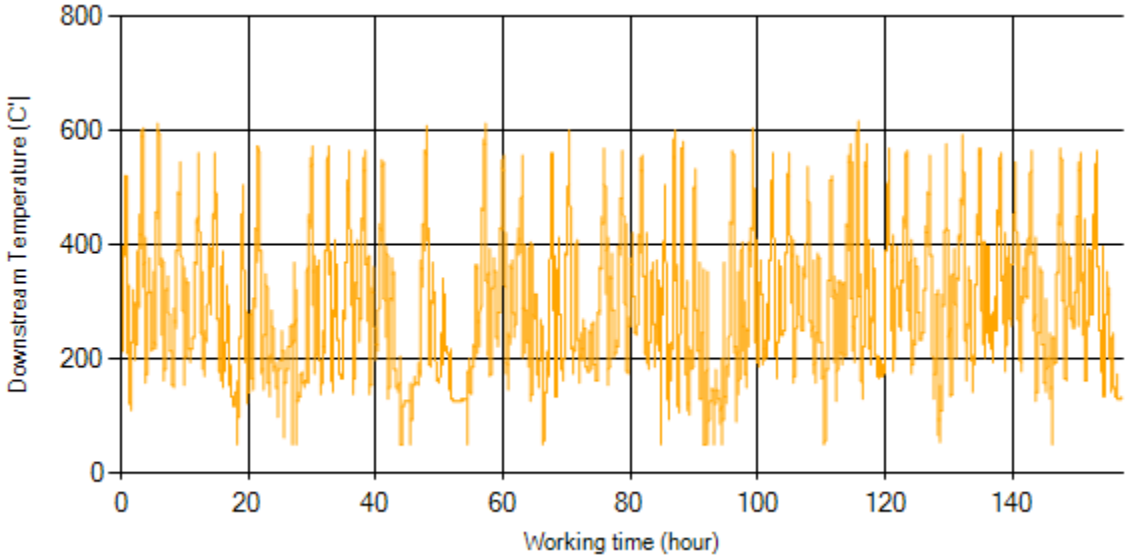


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

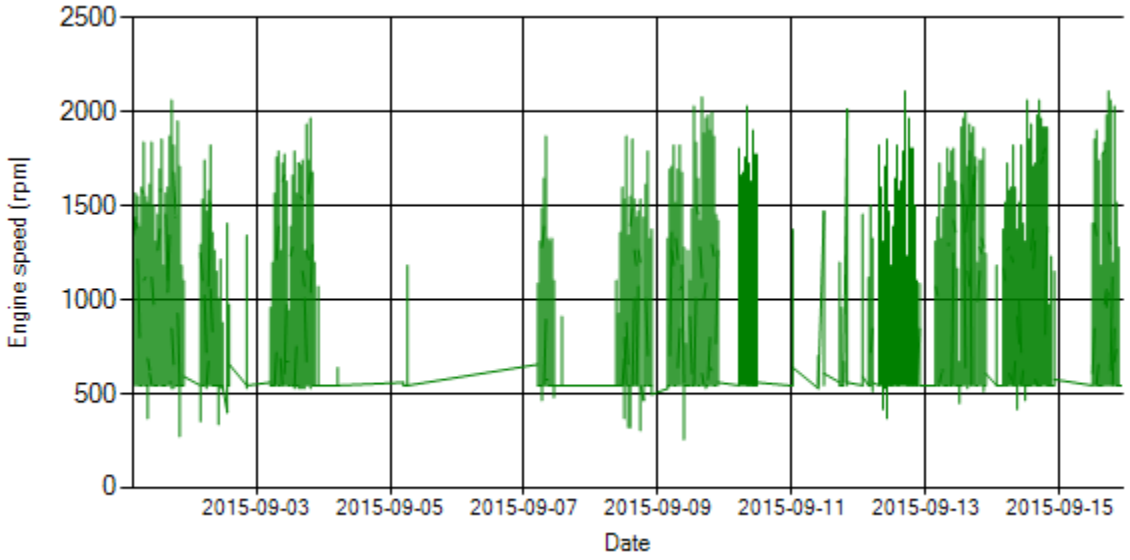


Figure 10- Engine speed distribution over the period

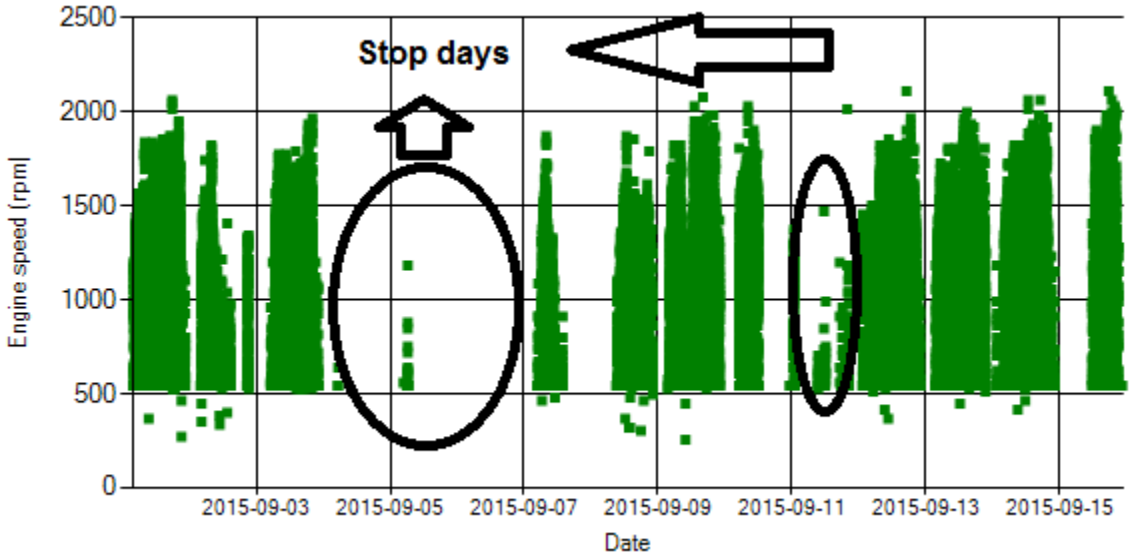


Figure 11- Engine speed diagram for calculating CPK's working days

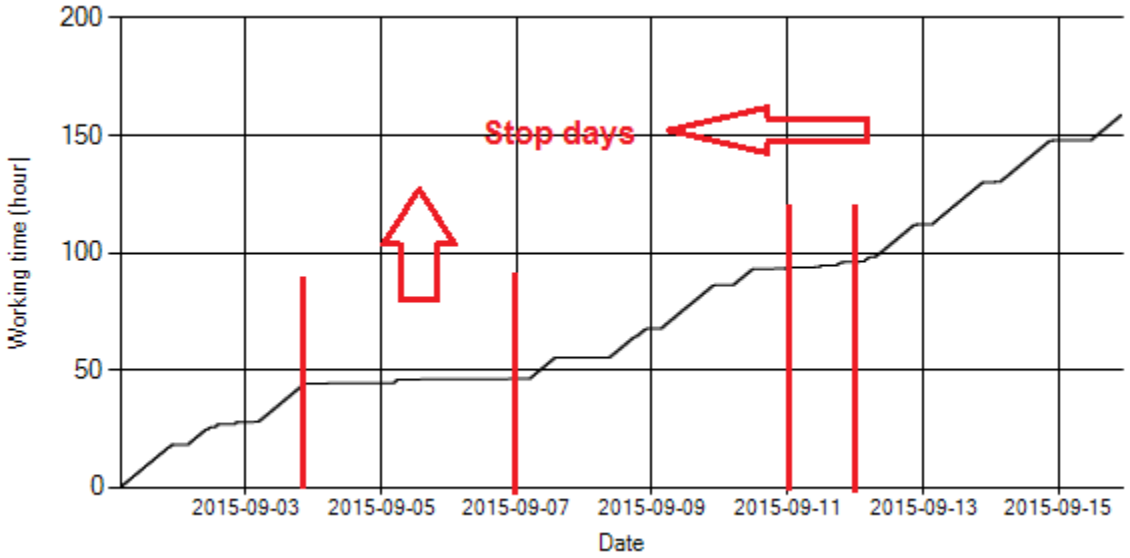


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

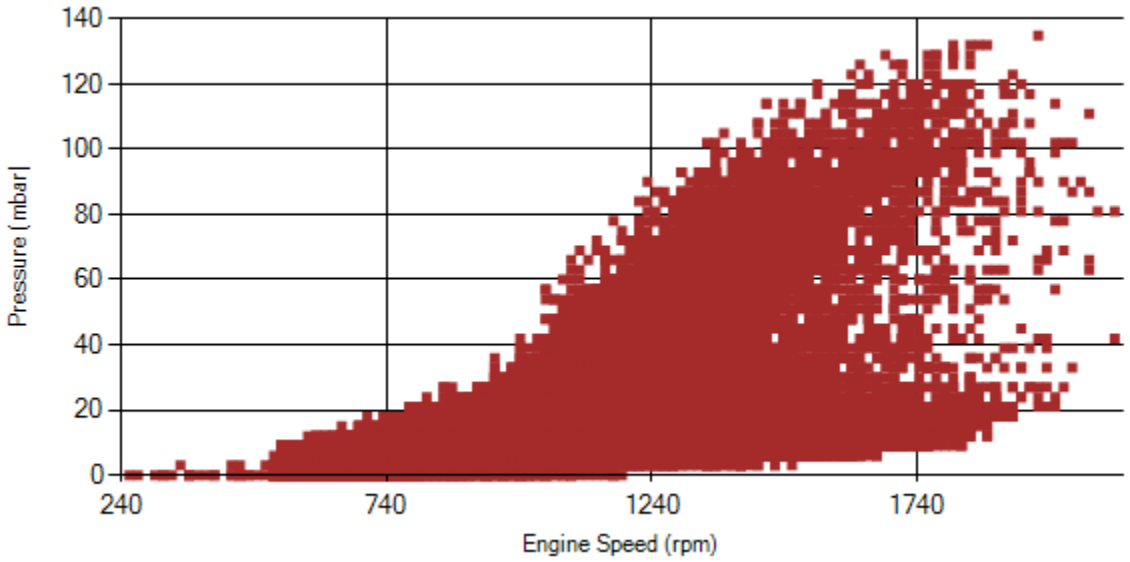


Figure 13- Pressure against engine speed

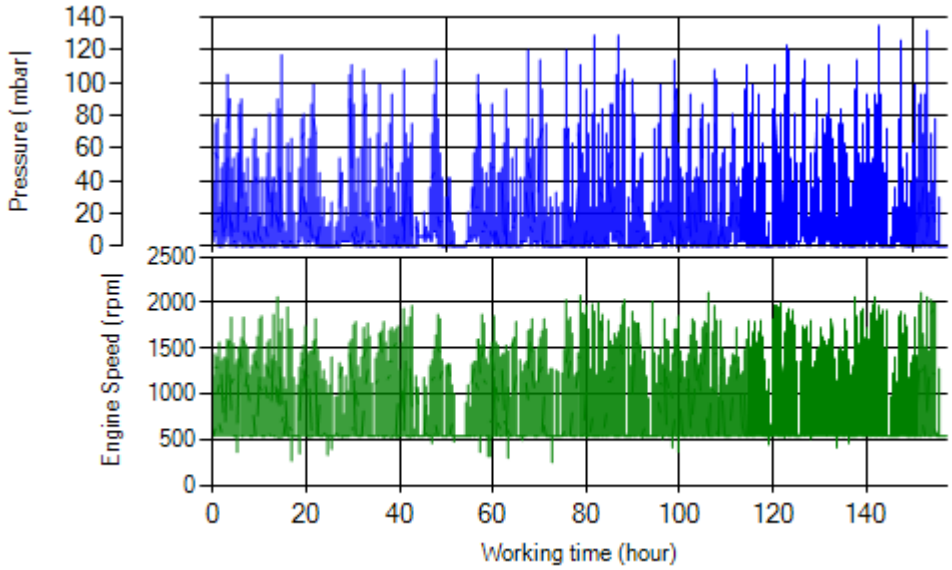


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

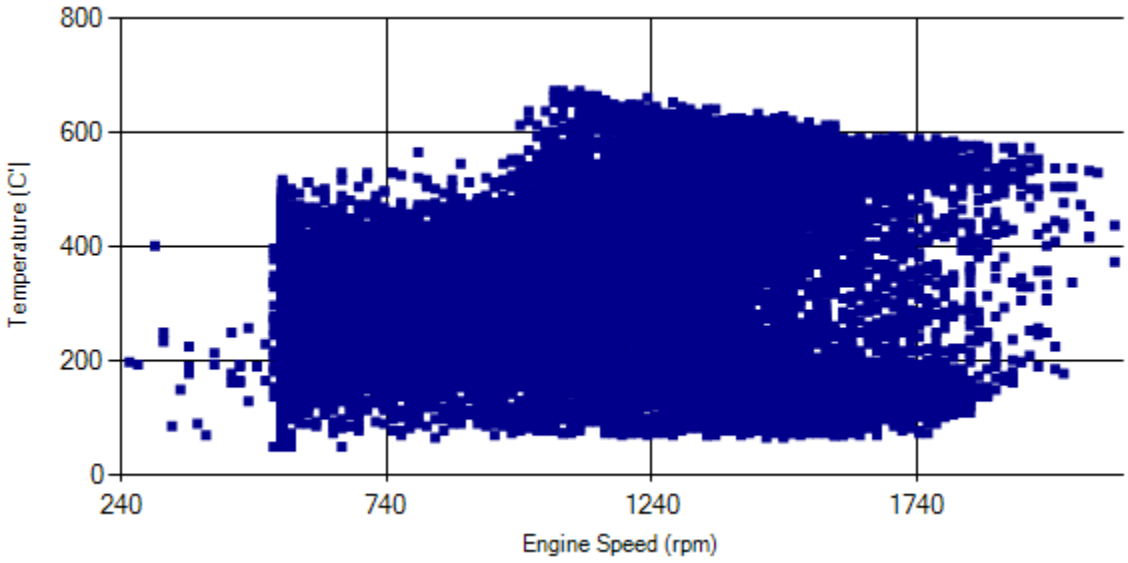


Figure 15- Temperature against engine speed

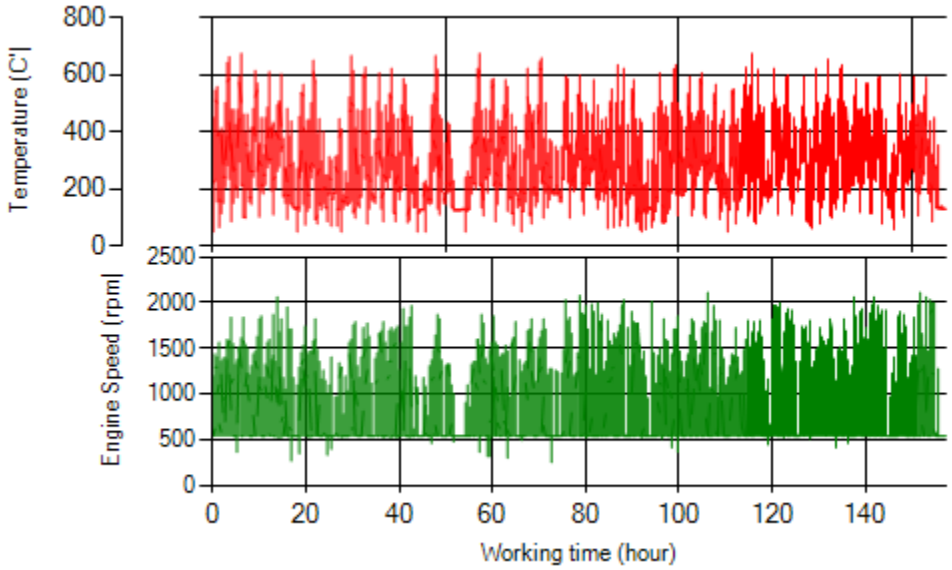


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, pressure above 150 mbar wasn't observed during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 16% of total working-time temperature is above 400 °C and 25% above 350°C.
- This vehicle operates in line 4, so due to path characteristic of this line, engine operates in high speed.

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

Overall Information

Table1- Overall Information

Vehicle plate number	85423
CPK data logger number	LN: 001505, DN: 2001, Sim Number +989218469621
Bus line	Number 4 (south to north bus line)
Bus Terminals	South Bus Terminal - Park Way Bus Tehran Terminal
Total path distance	22.8 km
DPF producer company	HJS_02 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Sep/2015- 30/Sep/2015 (fifteen days)
K value - DPF upstream	1.78 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	36760 km
Bus mileage over the period	2803 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	12 days
Working hours over the period	170 hours 36 minutes
Average working hours per day (including stop days)	11 hours 24 minutes
Bus average speed	17.8 km/hr
idle speed time to all working time ration	52.67 %
Total Bus fuel consumption over the period	1433 lit
Fuel consumption per hour	9.1 lit/hr
Average fuel consumption	0.51 lit/km
Total Bus additive consumption over the period	0.730 lit
Average additive consumption	260 cc/km
Additive consumption to fuel ration	510 cc per 1000 lit (batch dosing with tank level)

Notice: As depicted on figure 12, data logger didn't sample on 29th and 30th Sep. Also 30th was stop days, so one day average working hours were added to total working hours.

Temperature, Pressure and Engine Speed Overview

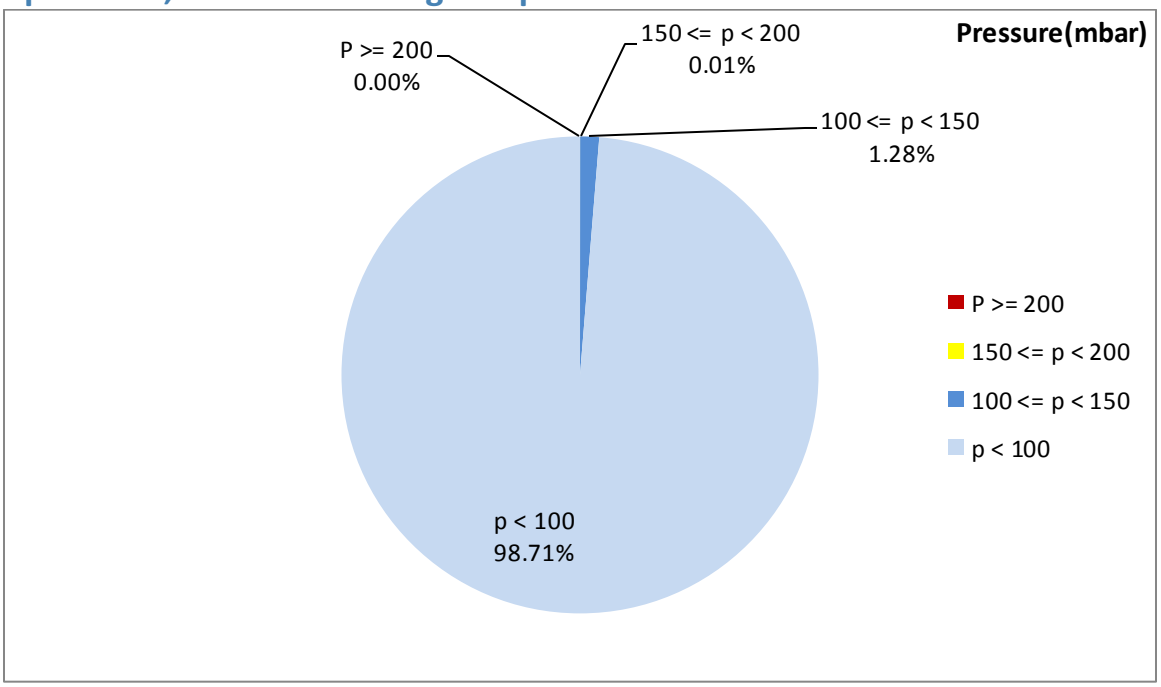


Figure 1- Pressure distribution over the working hours

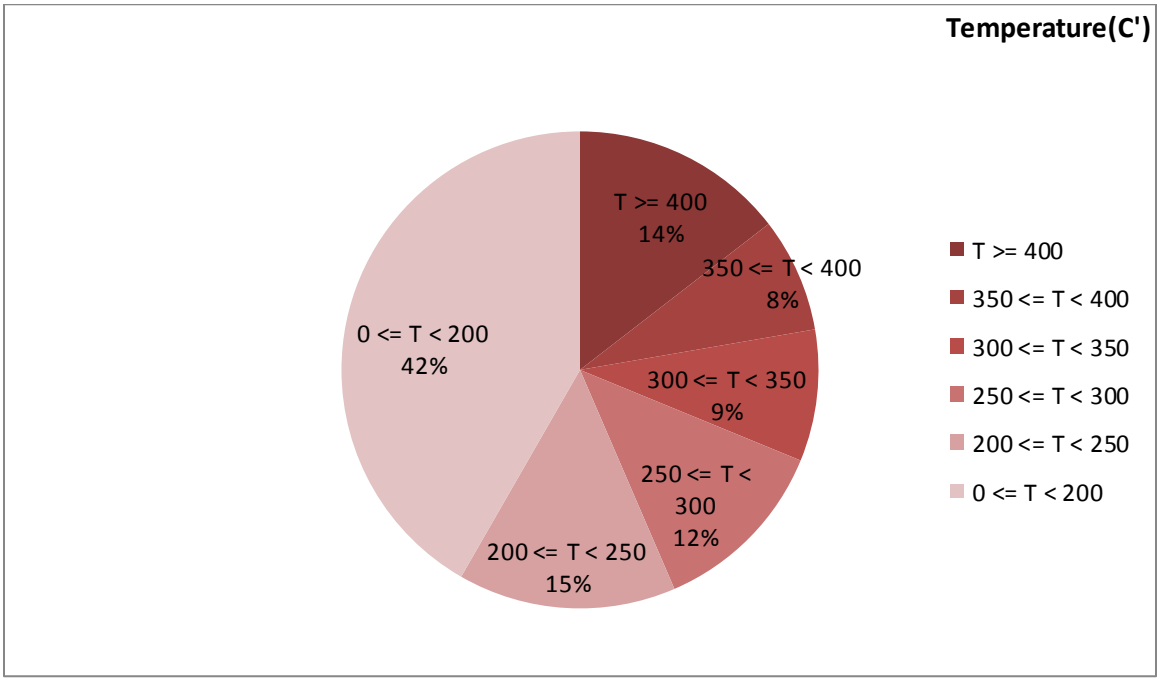


Figure 2-Temperature distribution over the working hours

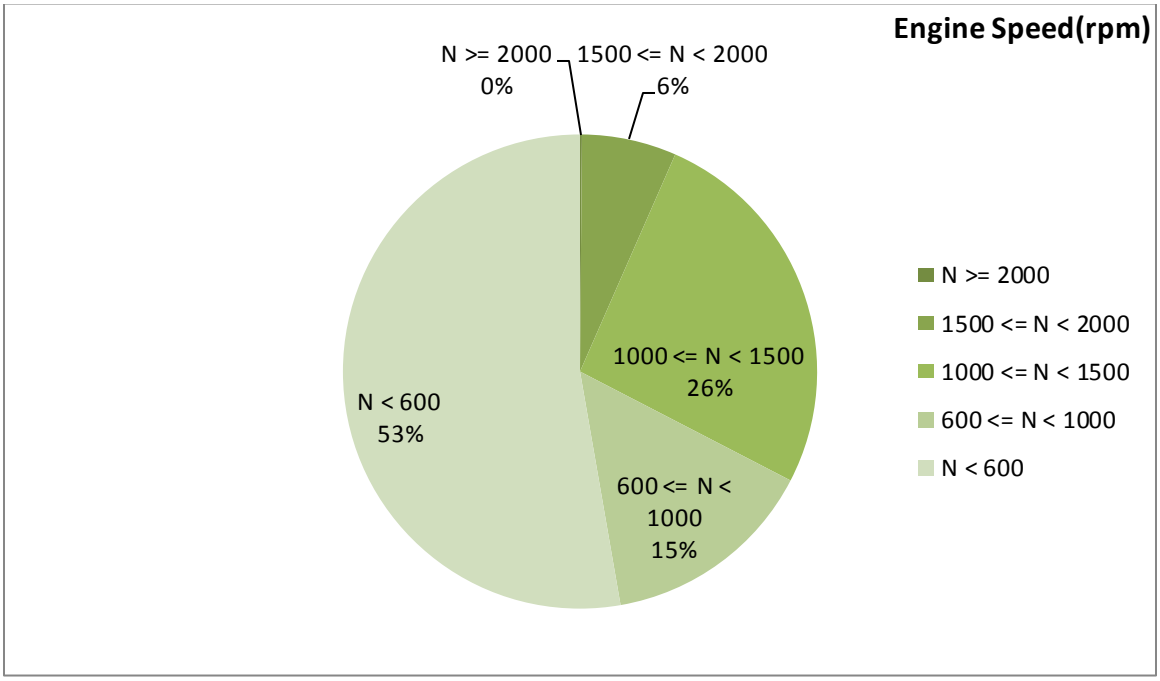


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
257.84	14.78	834

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
333.71	28.52	1154

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
682-50	159-0	2304-256

Detailed Pressure Analysis

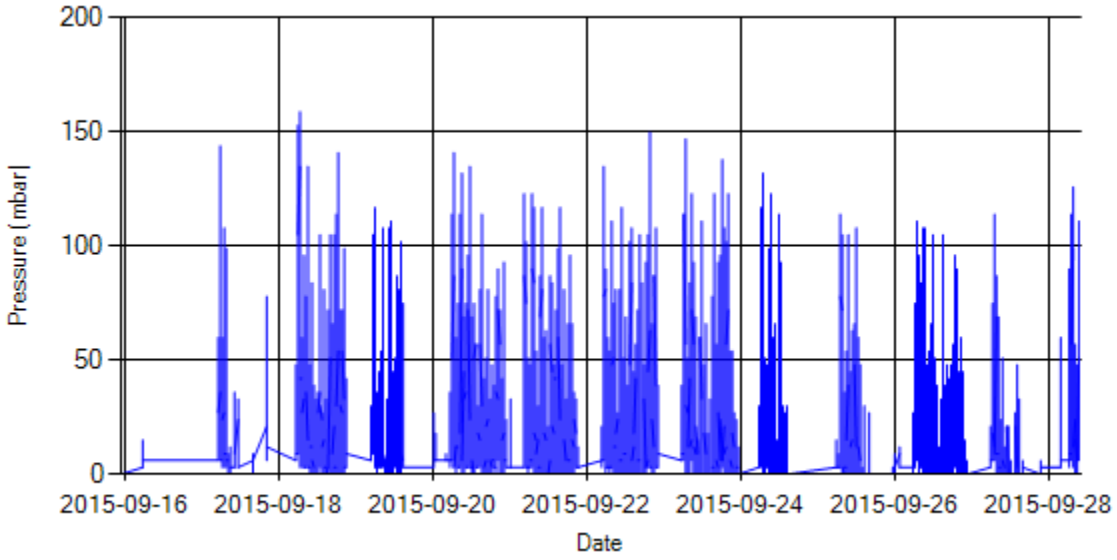


Figure 4- Pressure distribution over the period

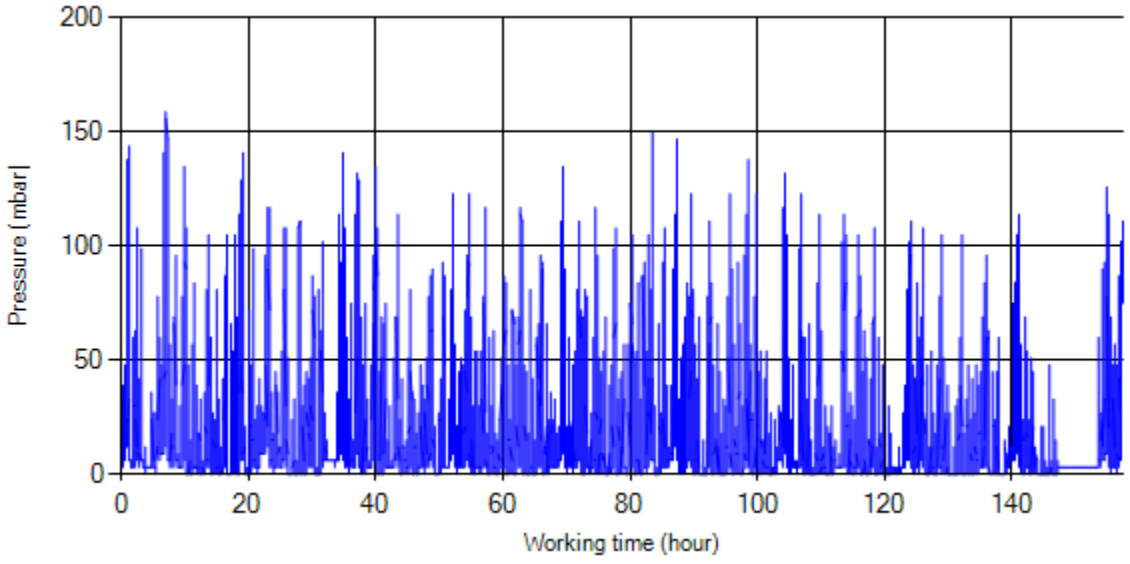


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

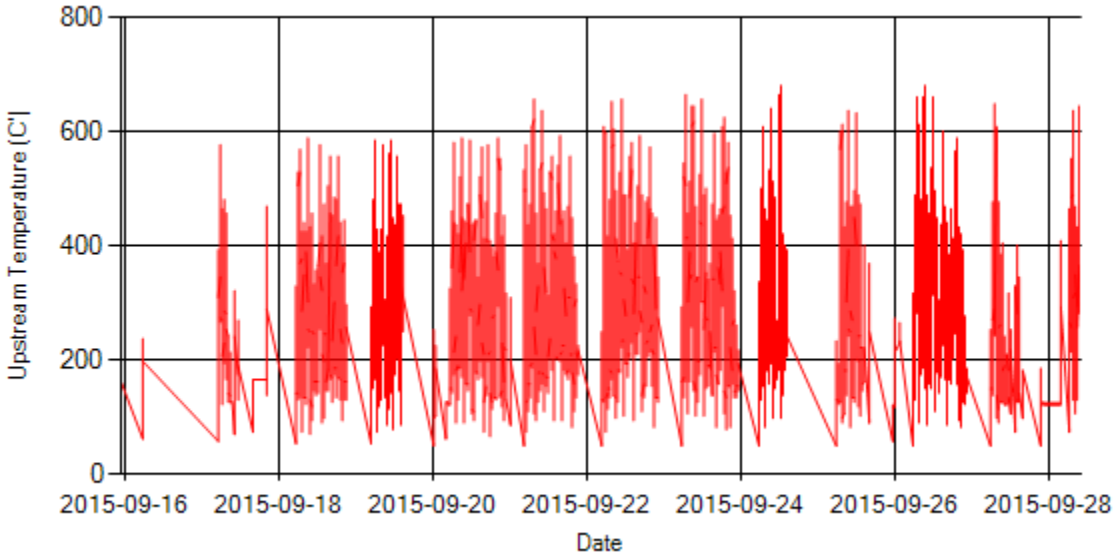


Figure 6- Temperature distribution over the period

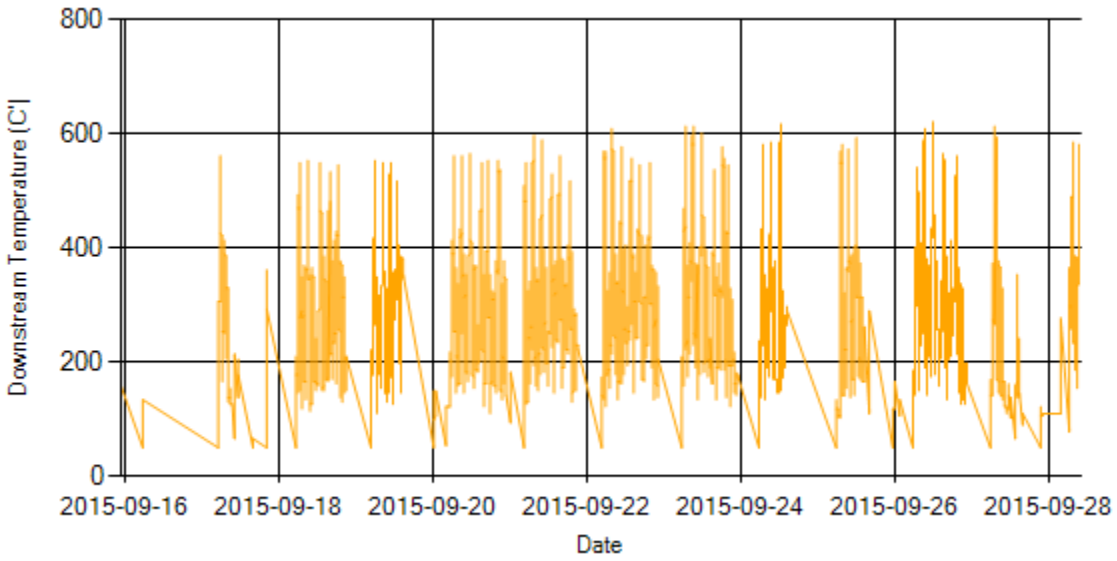


Figure 7- Temperature distribution over the period

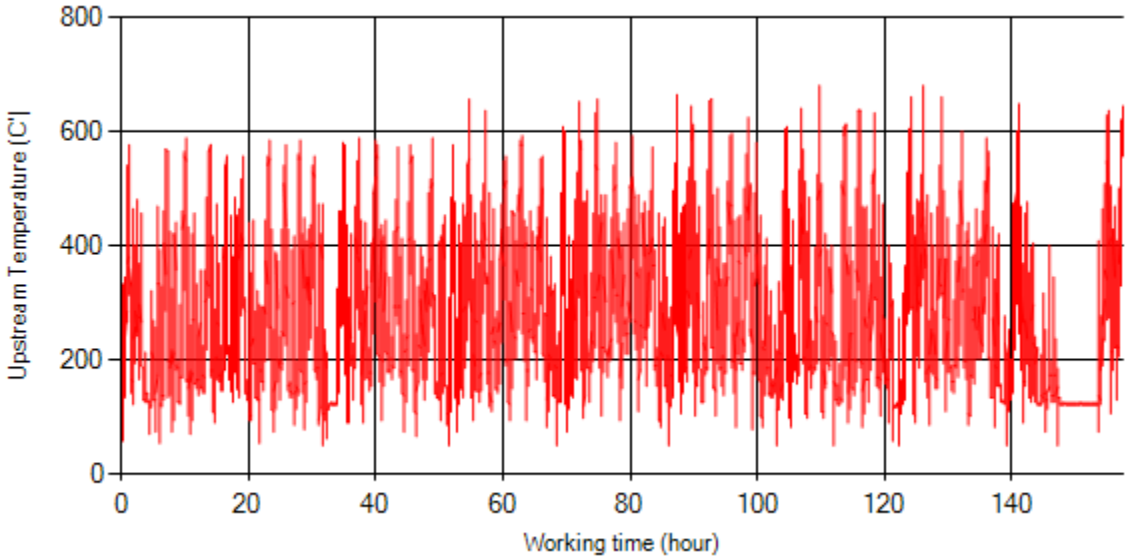


Figure 8- Temperature vs. working hours

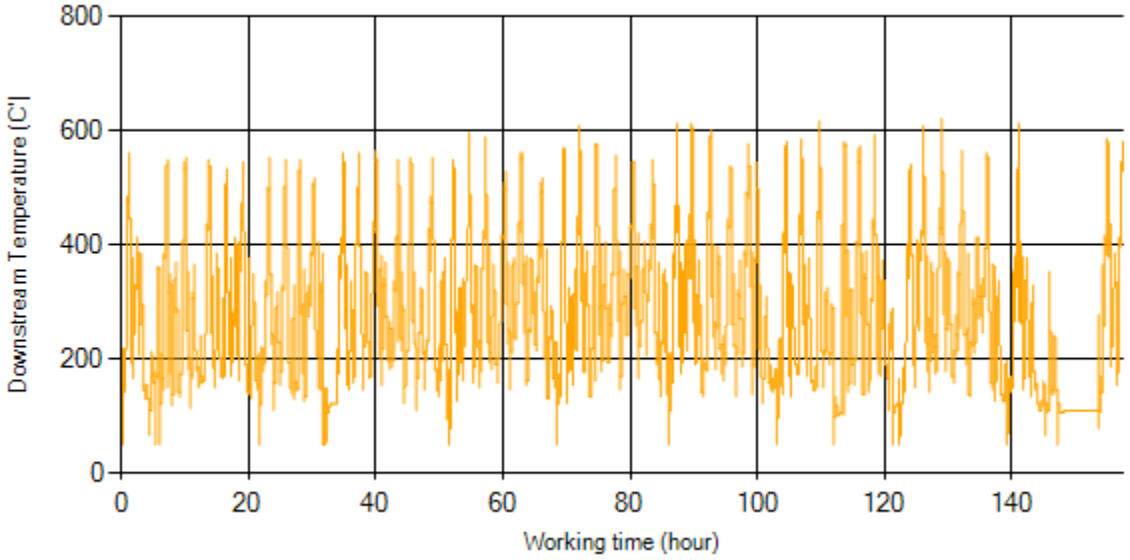


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

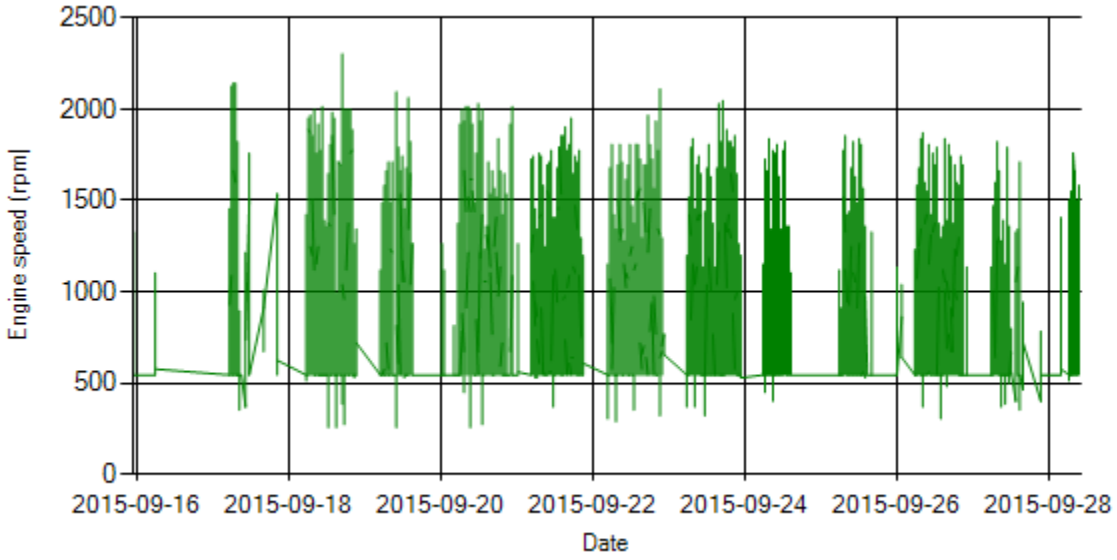


Figure 10- Engine speed distribution over the period

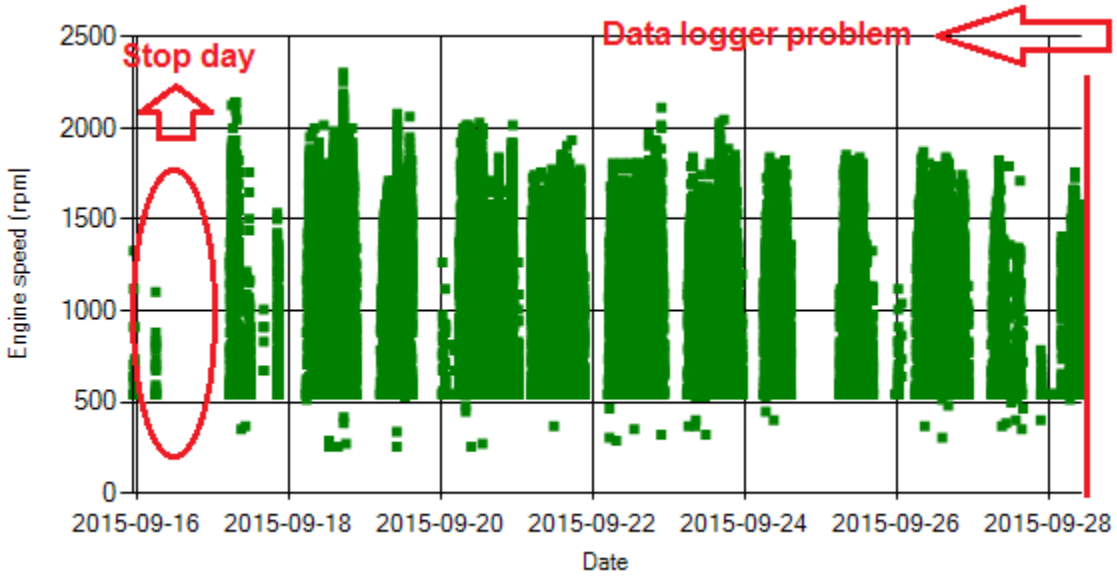


Figure 11- Engine speed diagram for calculating CPK's working days

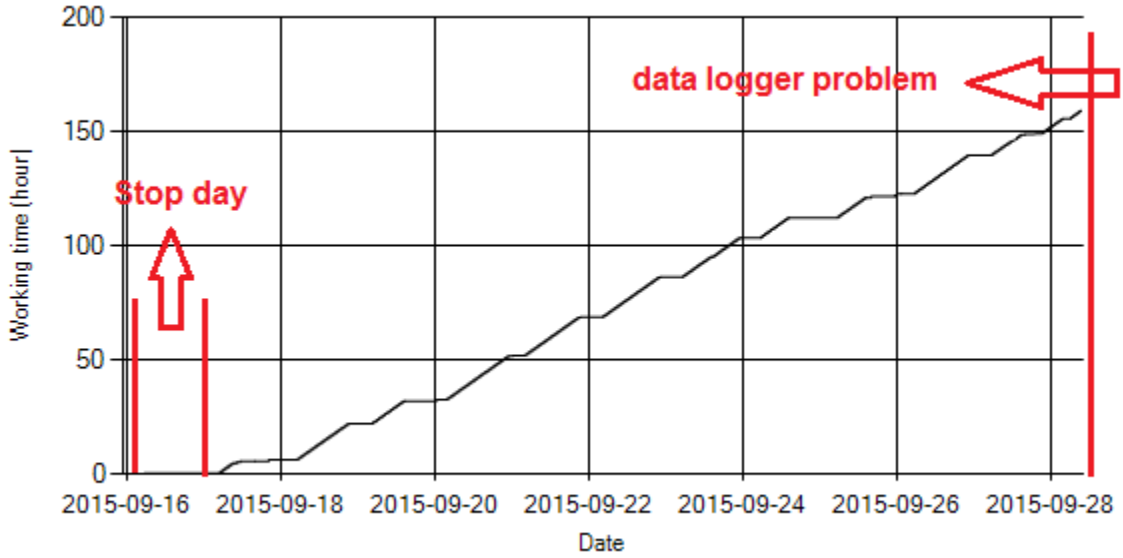


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. Data logger had problem on sep 29th and 30th. It is worth-mentioning Sep 30th also was stop days.

Pressure-Engine Speed diagrams

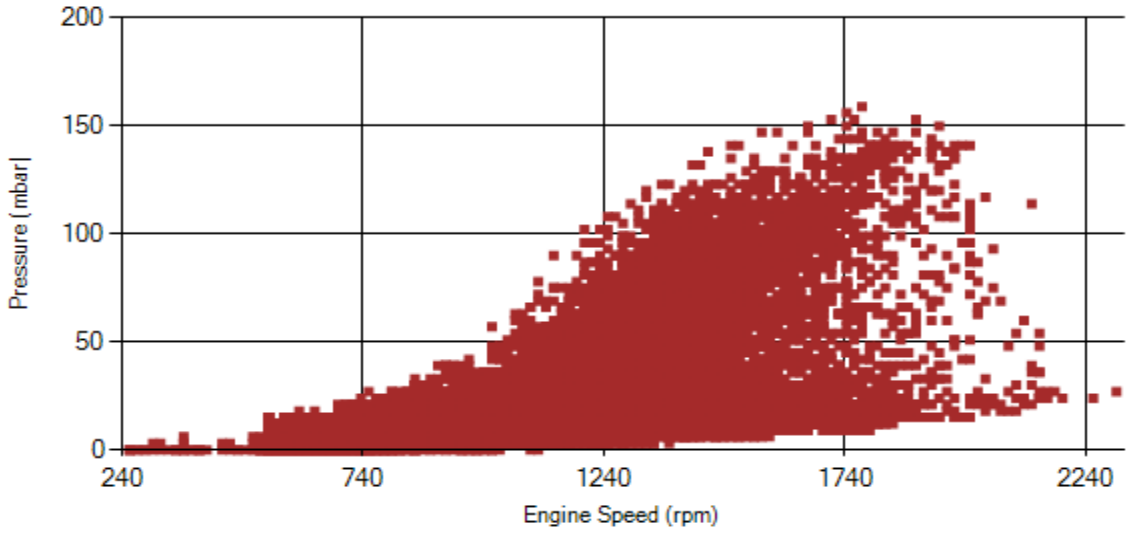


Figure 13- Pressure against engine speed

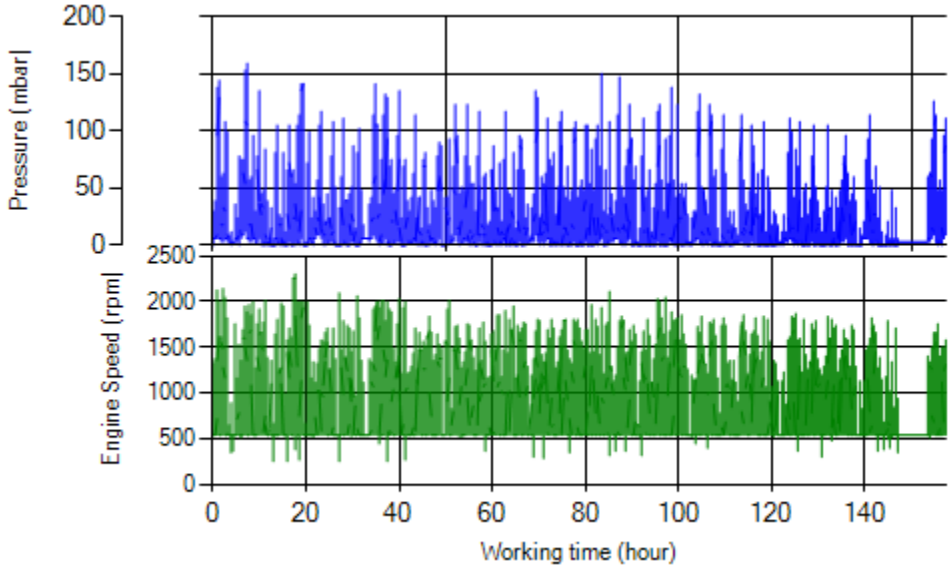


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

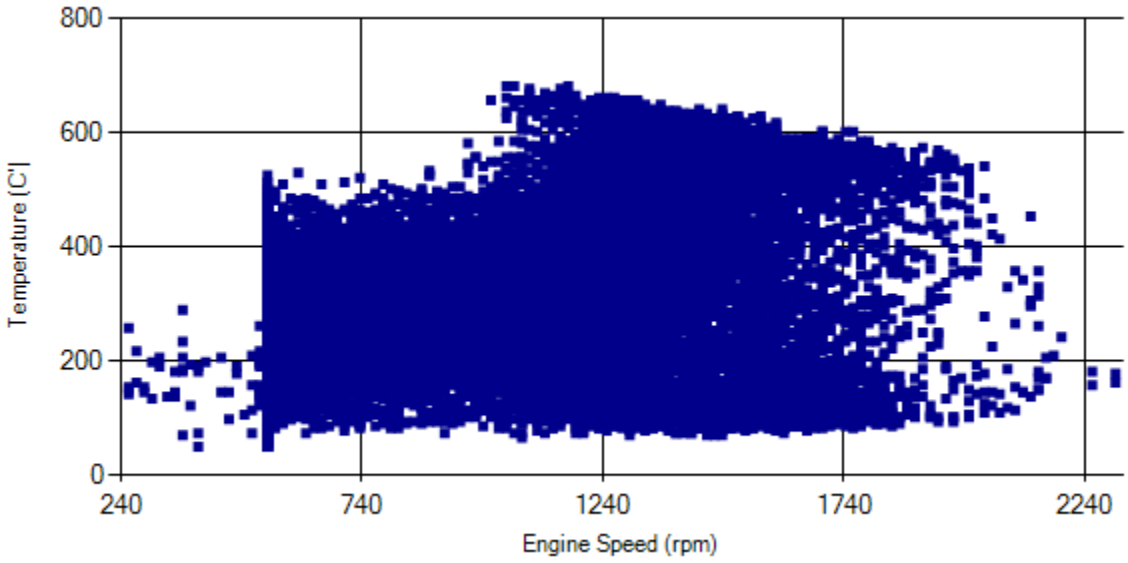


Figure 15- Temperature against engine speed

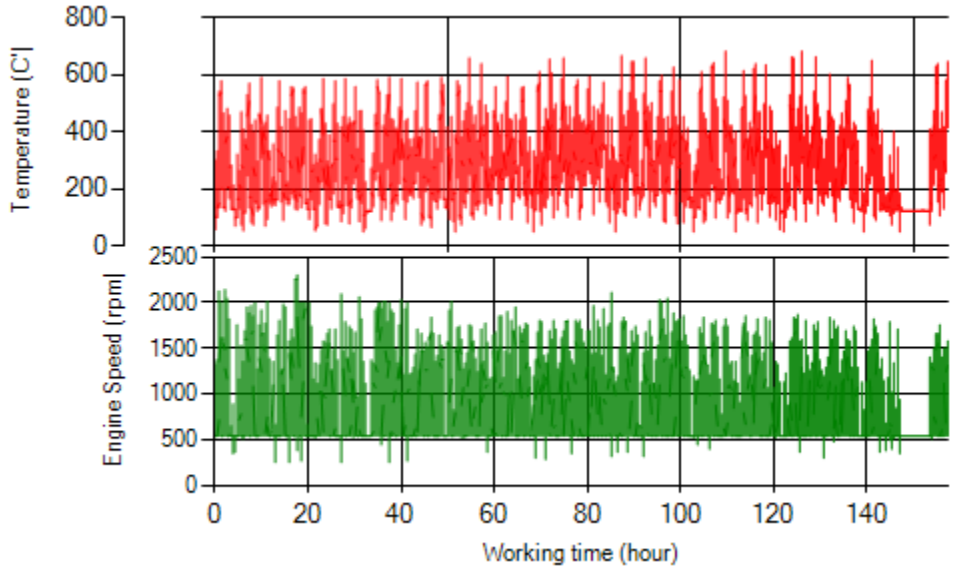


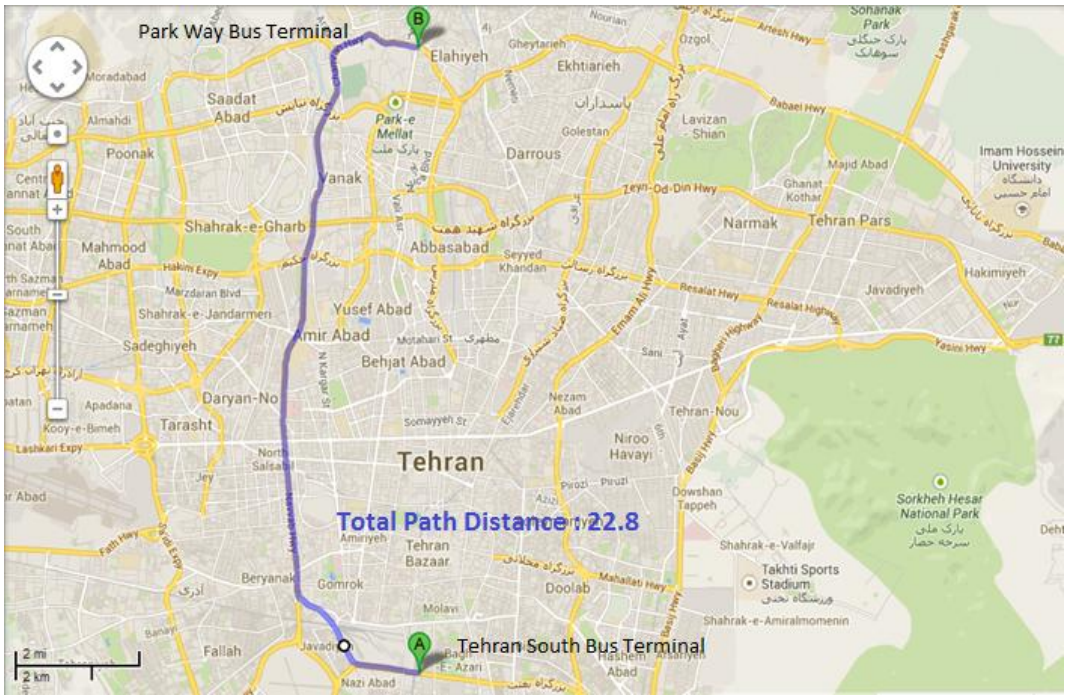
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.01% of time pressure was above 150 mbar during this period.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 14% of total working-time temperature is above 400 ℃ and 22% above 350℃.
- This vehicle operates in line 4, so due to path characteristic of this line, engine operates in high speed.

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

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



Overall Information

Table1- Overall Information

Vehicle plate number	78515
CPK data logger number	LN: 001490, DN: 1954, Sim Number +98000000000
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	Dinex_01 (passive system with FBC)
Installation date	22/Oct/2014
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value - DPF upstream	1.4 [1/m]
K value – DPF downstream	0.00 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	47923 km
Bus mileage over the period	1876 km
Working days over the period	11 days
Stop days	4 days
Data logger working days	11 days
Working hours over the period	144 hours 1 minutes
Average working hours per day (including stop days)	9 hours 35 minutes
Bus average speed	13.03 km/hr
idle speed time to all working time ration	51.39 %
Total Bus fuel consumption over the period	1234 lit
Fuel consumption per hour	8.57 lit/hr
Average fuel consumption	0.66 lit/km
Total Bus additive consumption over the period	0.330 lit
Average additive consumption	176 cc/km
Additive consumption to fuel ration	267 cc per 1000 lit (continuous dosing)

Temperature, Pressure and Engine Speed Overview

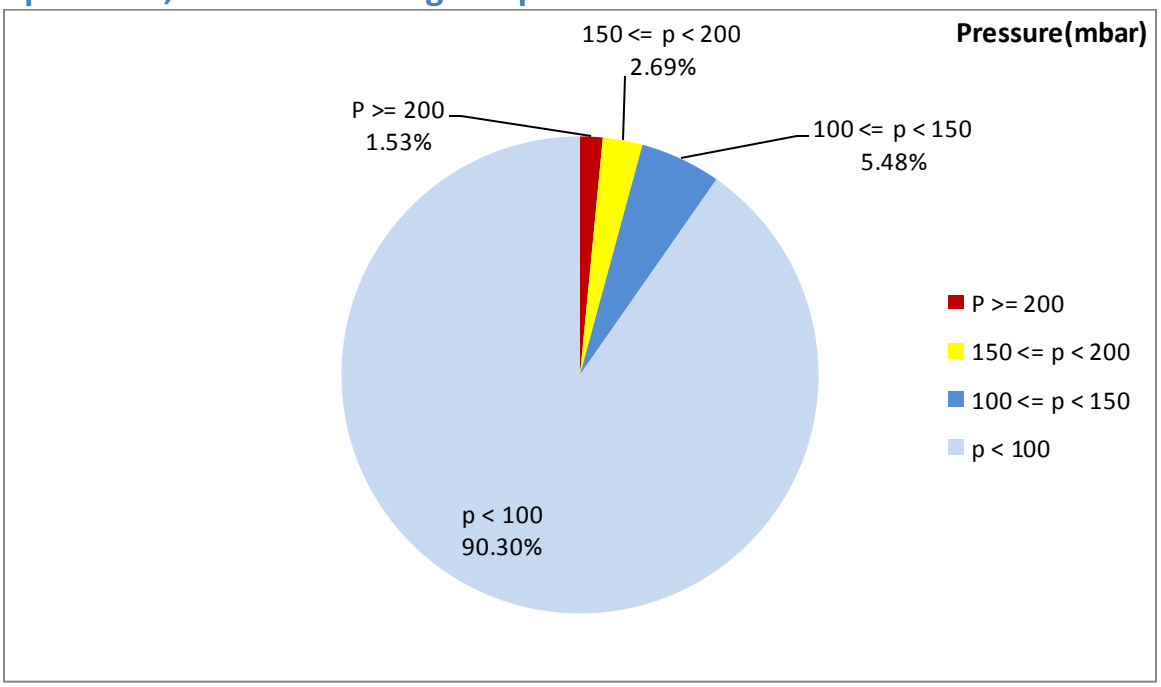


Figure 1- Pressure distribution over the working hours

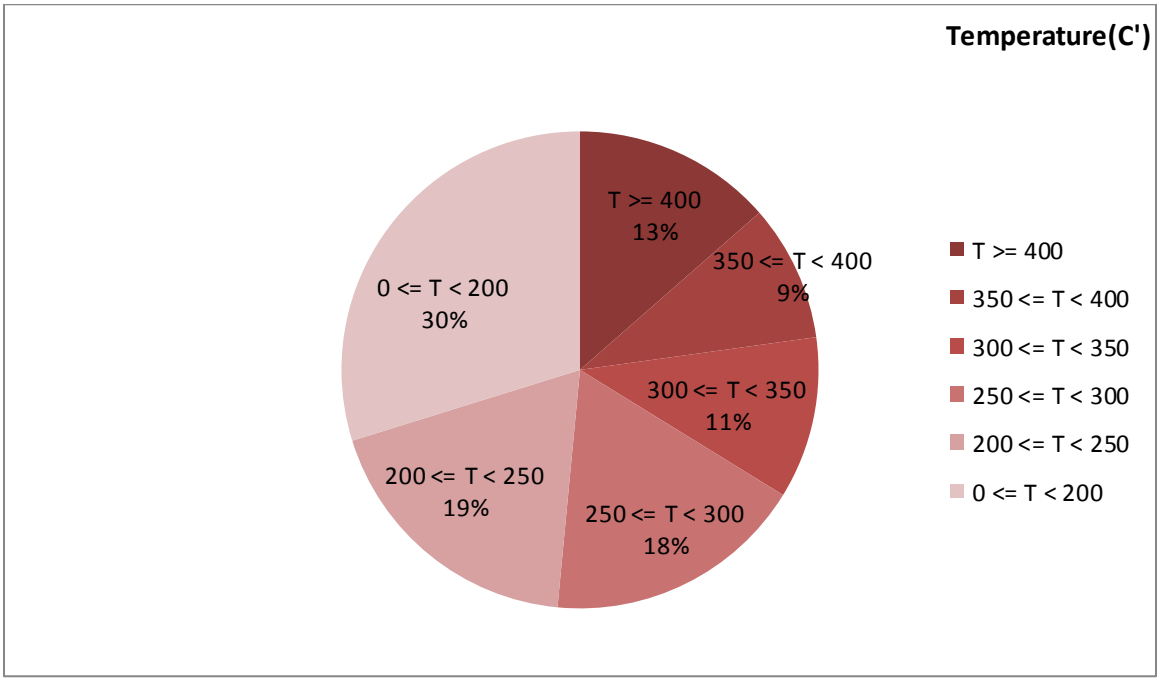


Figure 2-Temperature distribution over the working hours

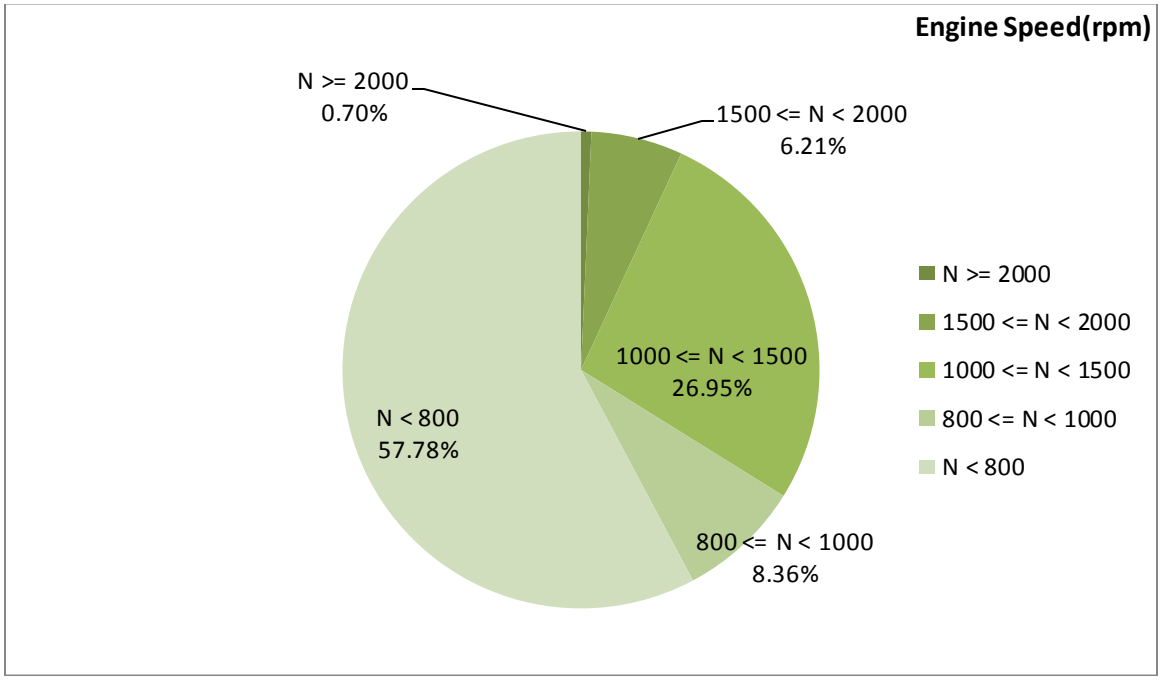


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
269.28	37.7	848

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
322.54	64.37	1160

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
582-50	318-0	2336-272

Detailed Pressure Analysis

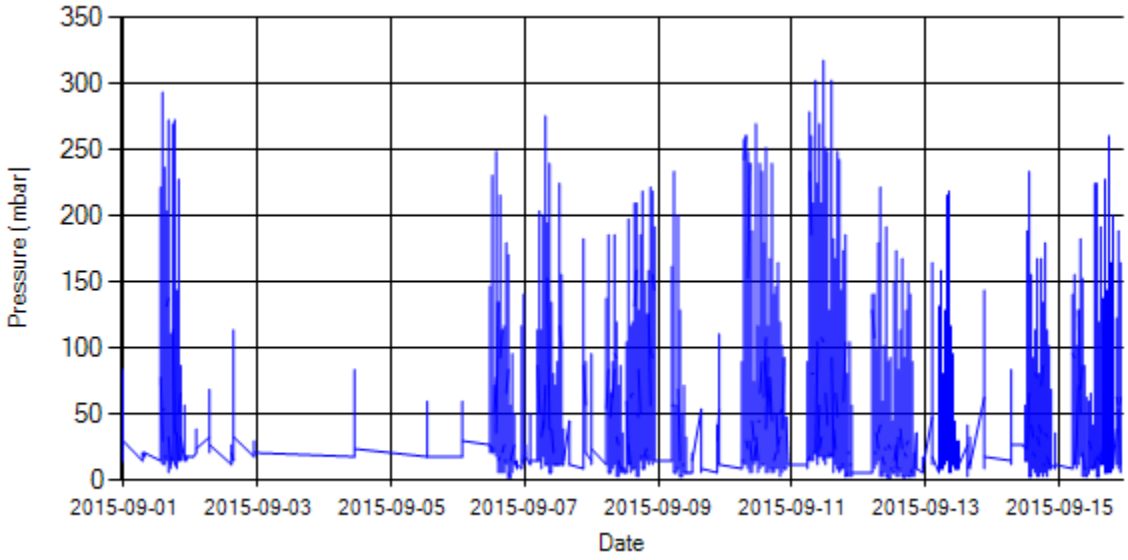


Figure 4- Pressure distribution over the period

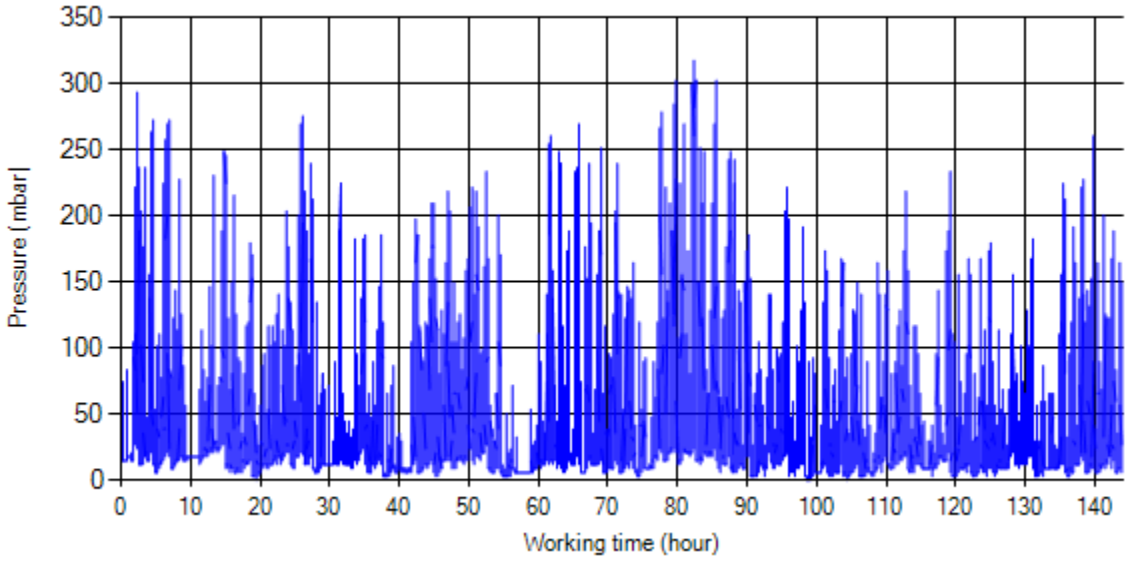


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

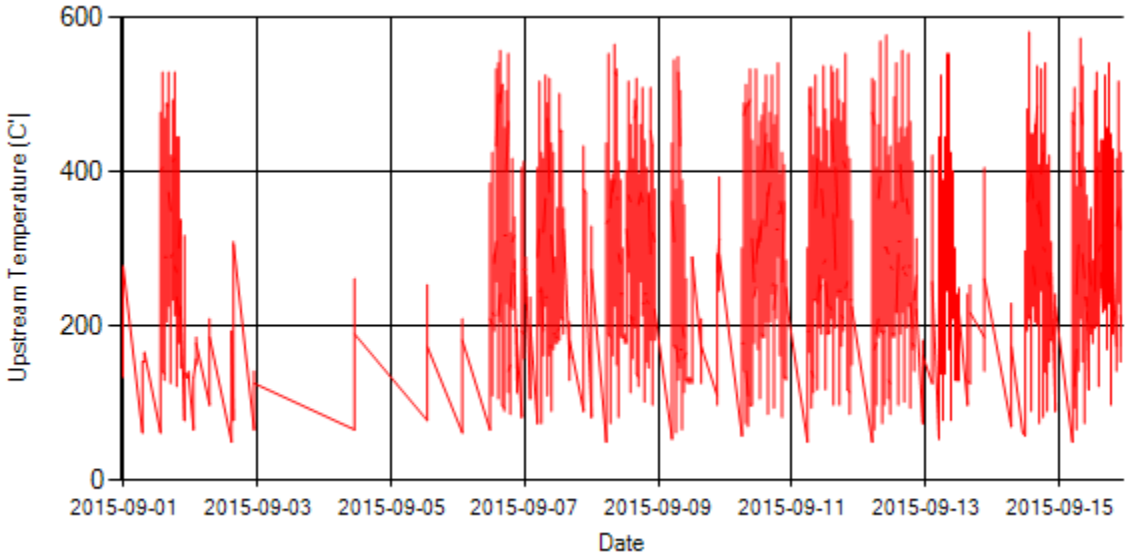


Figure 6- Temperature distribution over the period

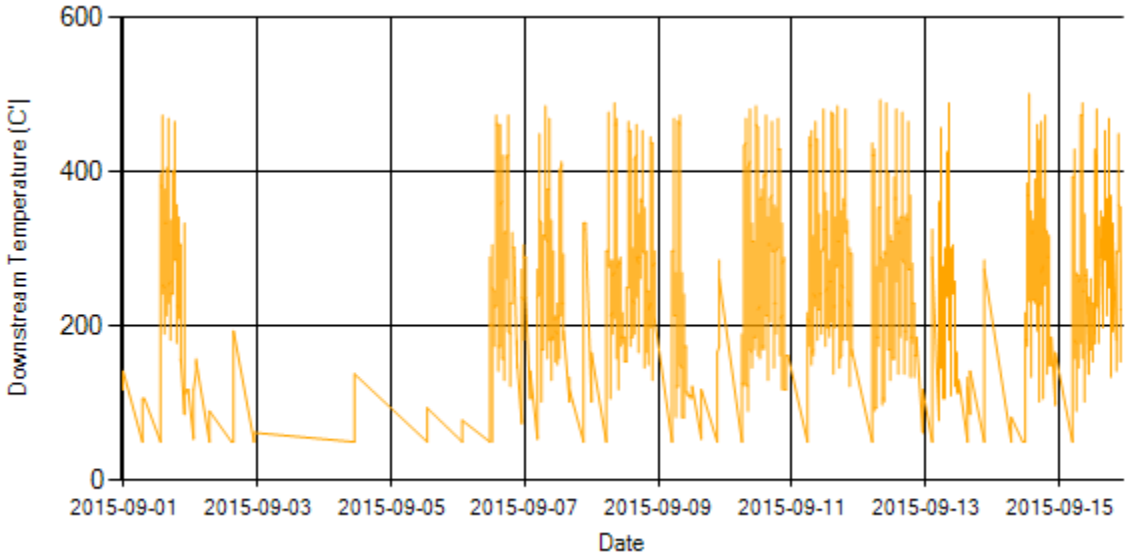


Figure 7- Temperature distribution over the period

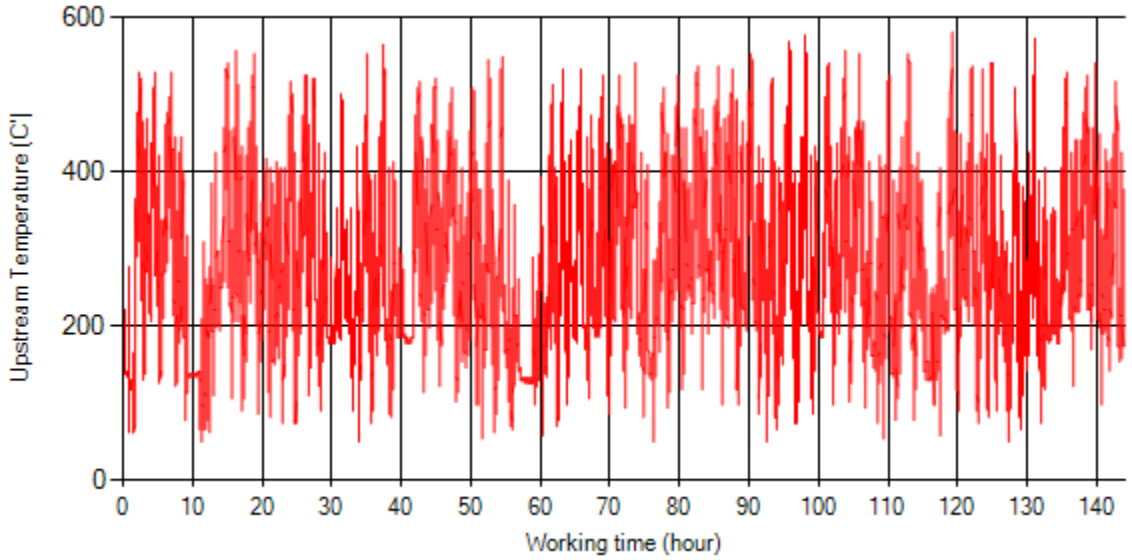


Figure 8- Temperature vs. working hours

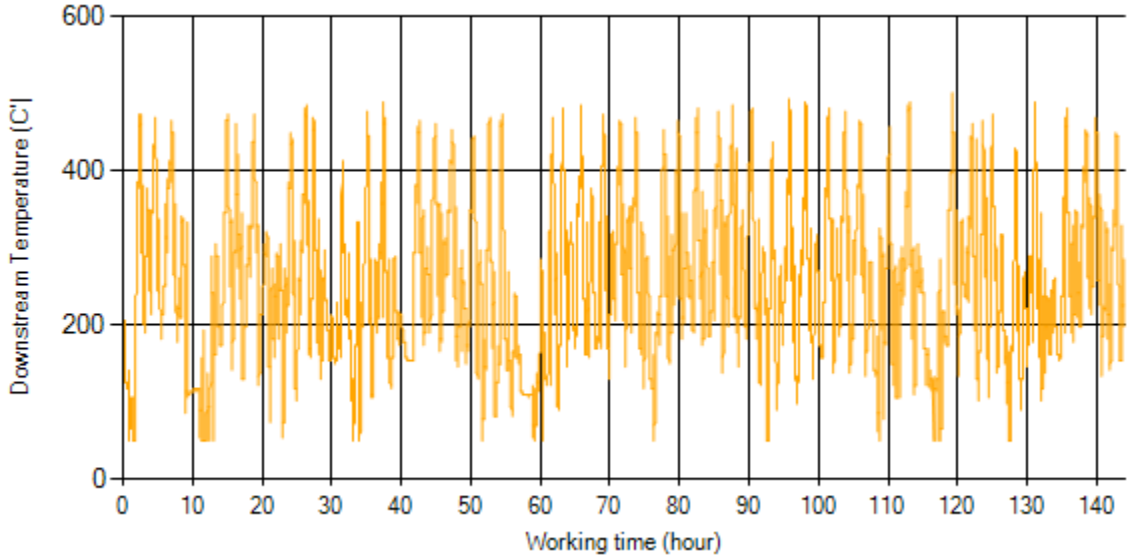


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

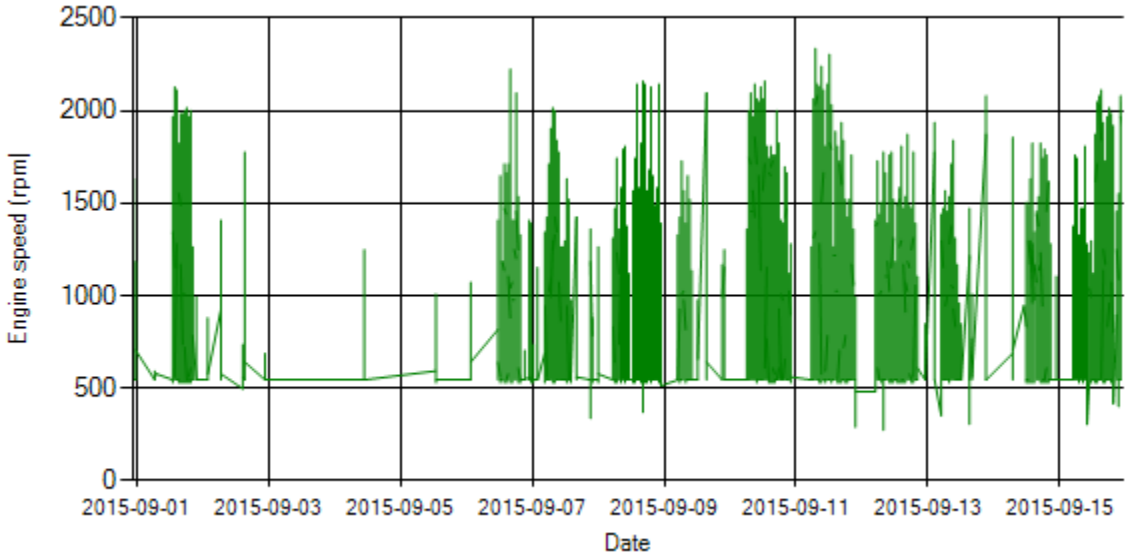


Figure 10- Engine speed distribution over the period

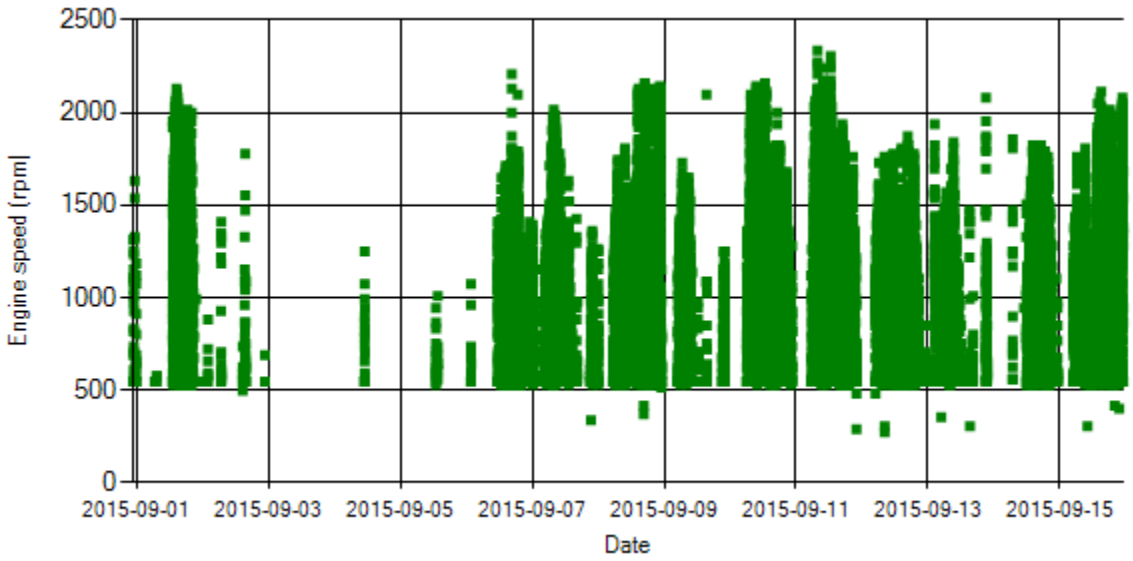


Figure 11- Engine speed diagram for calculating CPK's working days

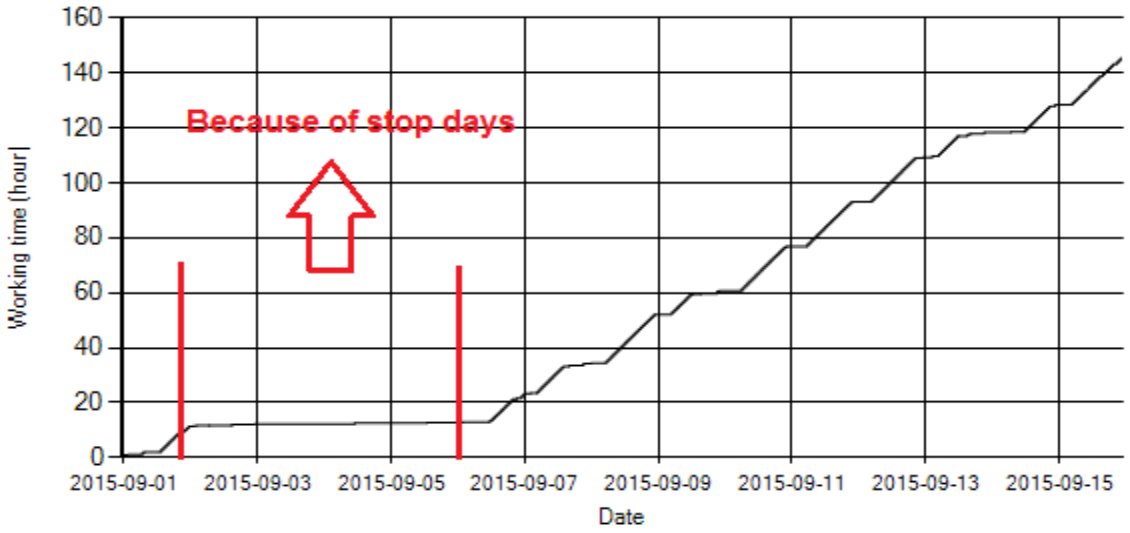


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger didn't sample from Aug 2nd until 5th because of stop days.

Pressure-Engine Speed diagrams

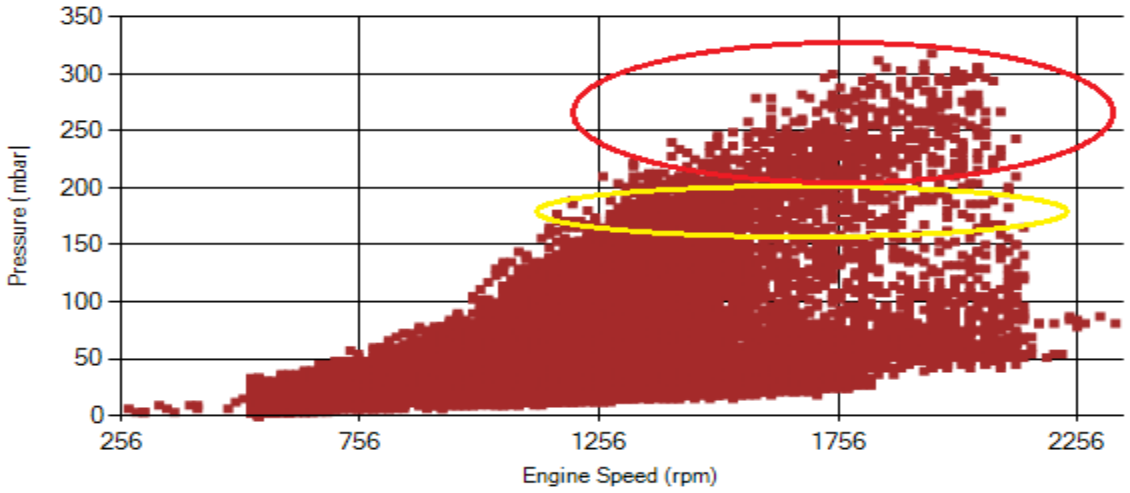


Figure 13- Pressure against engine speed

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

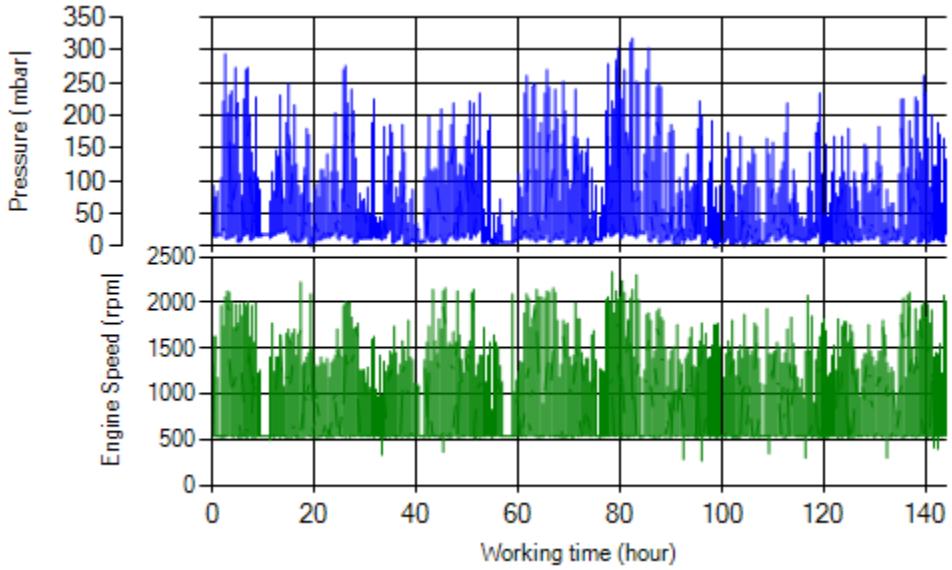


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

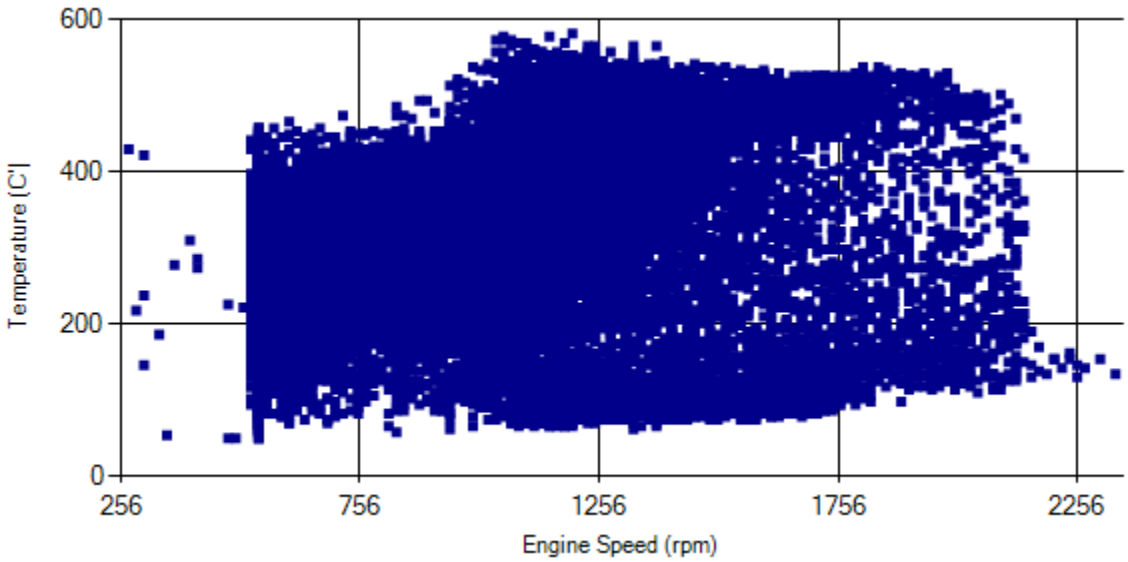


Figure 15- Temperature against engine speed

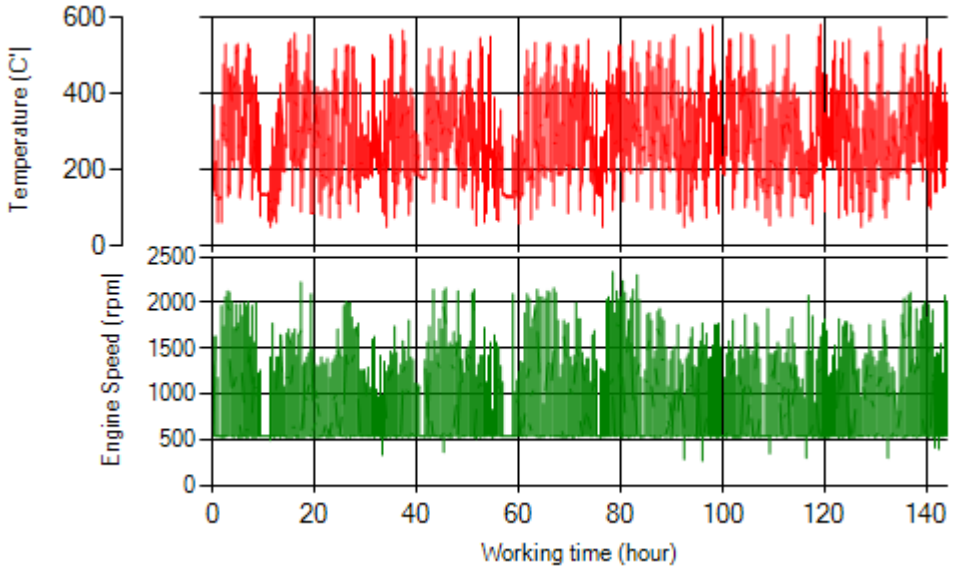


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 1.53% of working time pressure was above 200 mbar and only 4.22% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 13% of total working time, temperature is above 400 ℃ and 22% above 350℃.

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

Overall Information

Table1- Overall Information

Vehicle plate number	78515
CPK data logger number	LN: 001490, DN: 1954, Sim Number +98000000000
Bus line	Number 4 (south to north bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	Dinex_01 (passive system with FBC)
Installation date	22/Oct/2014
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value - DPF upstream	1.4 [1/m]
K value – DPF downstream	0.00 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	48503 km
Bus mileage over the period	580 km
Working days over the period	2 days
Stop days	13 days
Data logger working days	2 days
Working hours over the period	31 hours 52 minutes
Average working hours per day (including stop days)	2 hours 7 minutes
Bus average speed	18.2 km/hr
idle speed time to all working time ration	49.47 %
Total Bus fuel consumption over the period	325 lit
Fuel consumption per hour	10.2 lit/hr
Average fuel consumption	0.56 lit/km
Total Bus additive consumption over the period	- lit
Average additive consumption	- cc/km
Additive consumption to fuel ration	- cc/1000lit

Notice: System worked only three days during this period, so additive consumption measurement was so hard and unreliable.

Temperature, Pressure and Engine Speed Overview

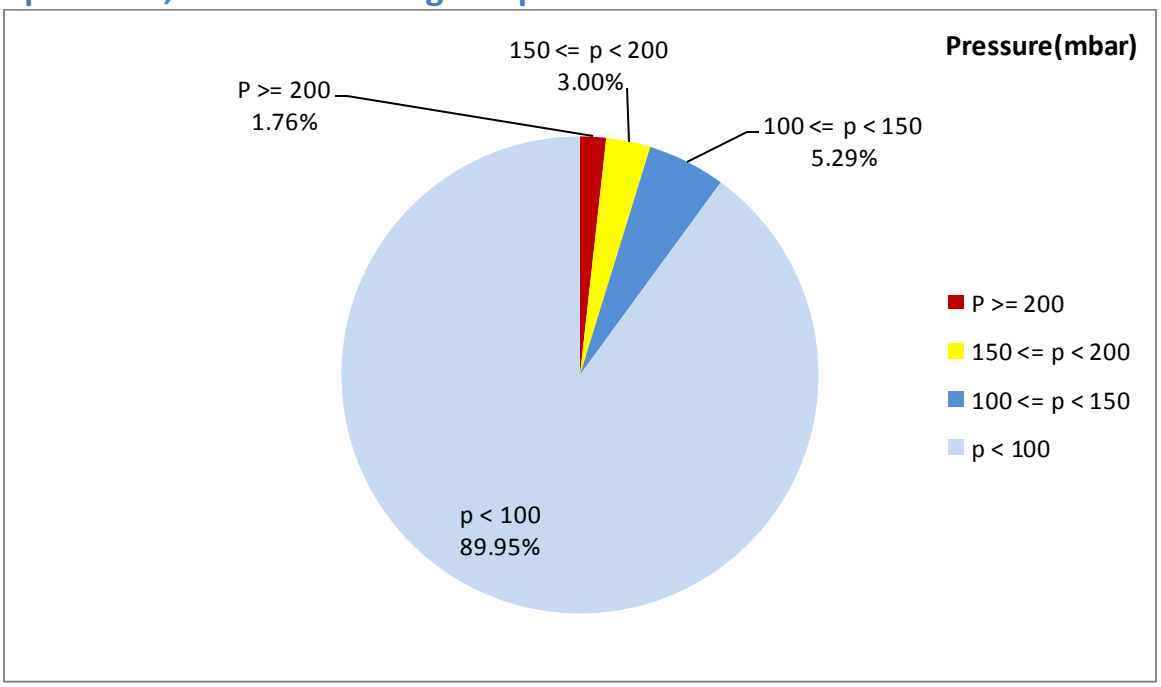


Figure 1- Pressure distribution over the working hours

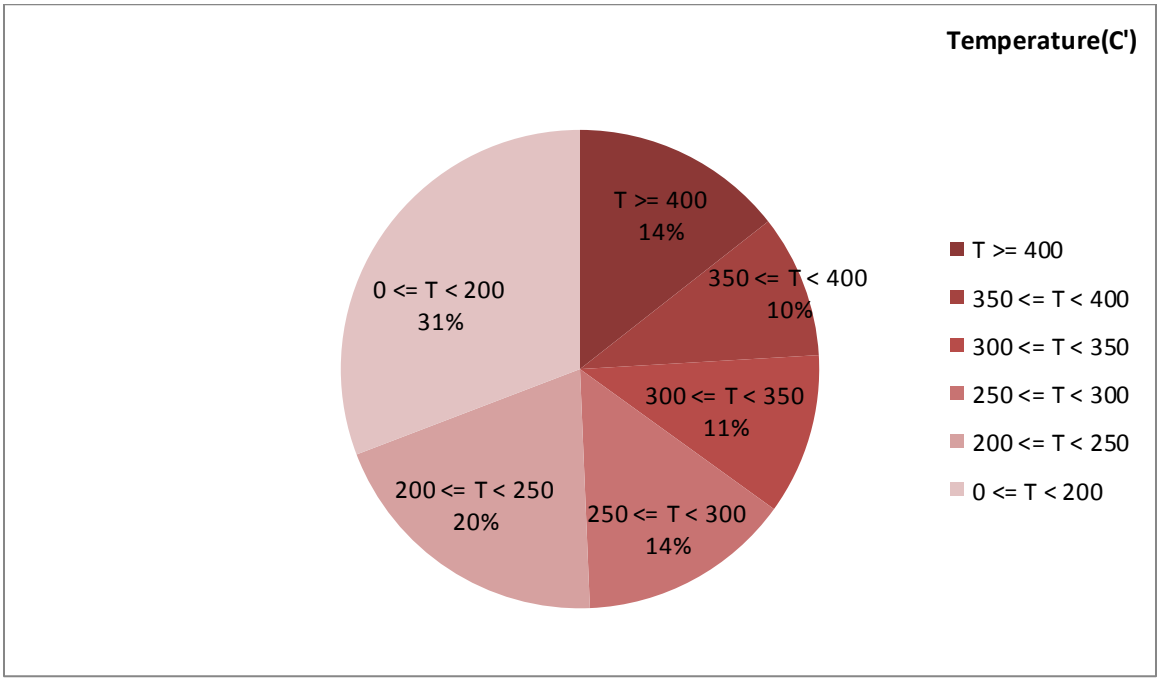


Figure 2-Temperature distribution over the working hours

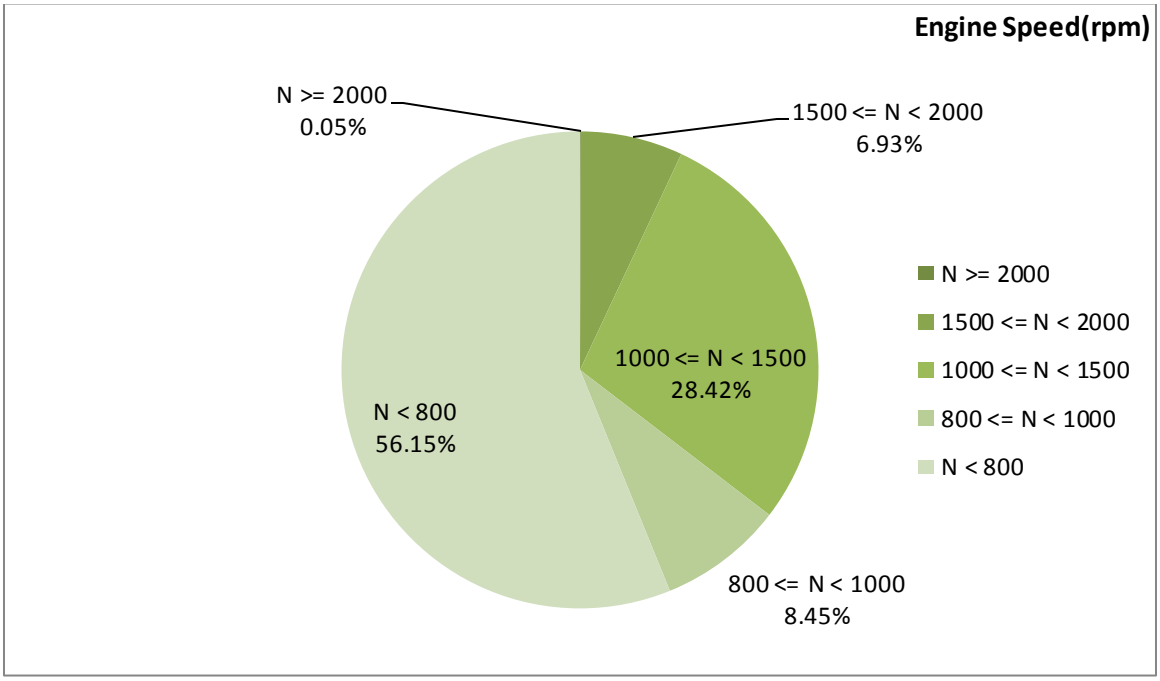


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
270.47	39.06	854

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
320.94	64.45	1149

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
574-50	288-0	2112-368

Detailed Pressure Analysis

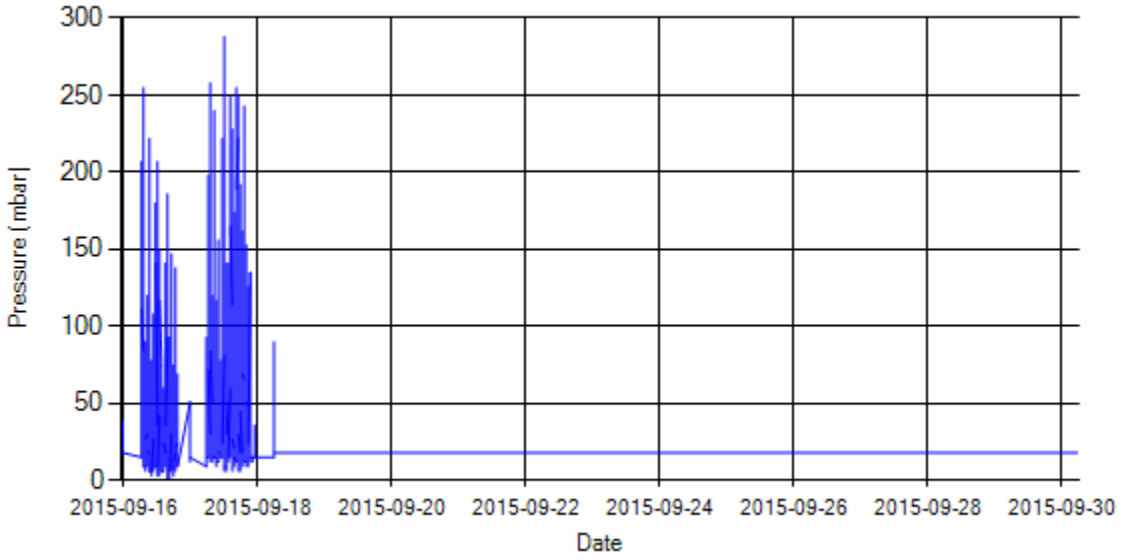


Figure 4- Pressure distribution over the period

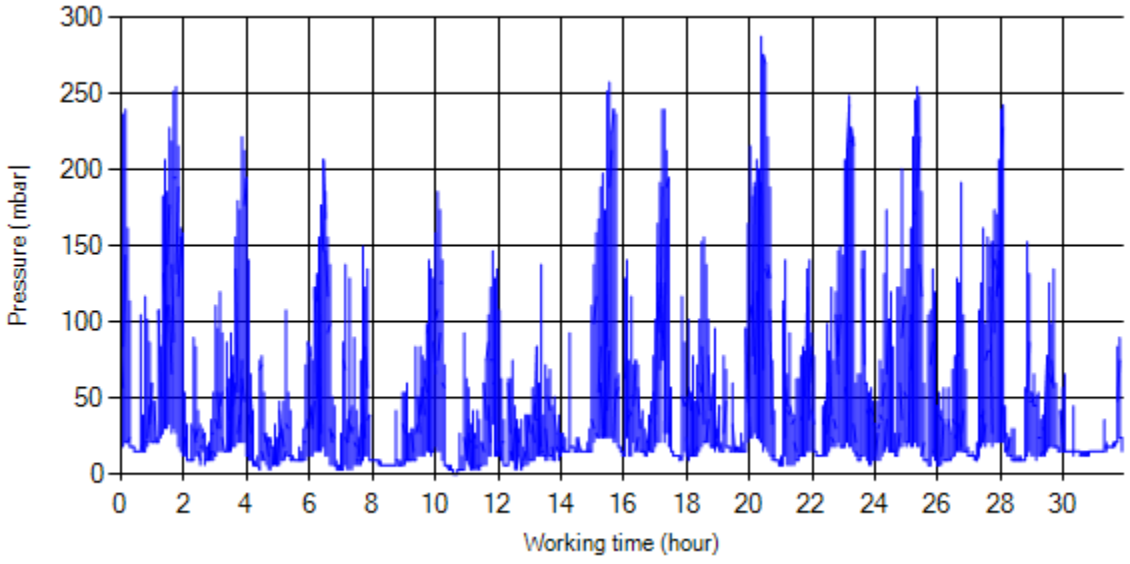


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

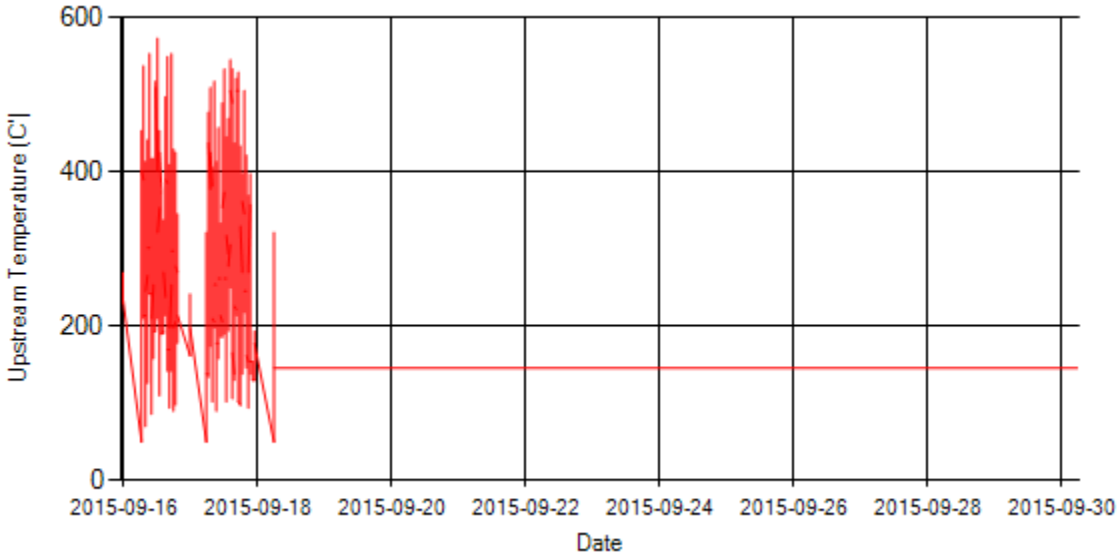


Figure 6- Temperature distribution over the period

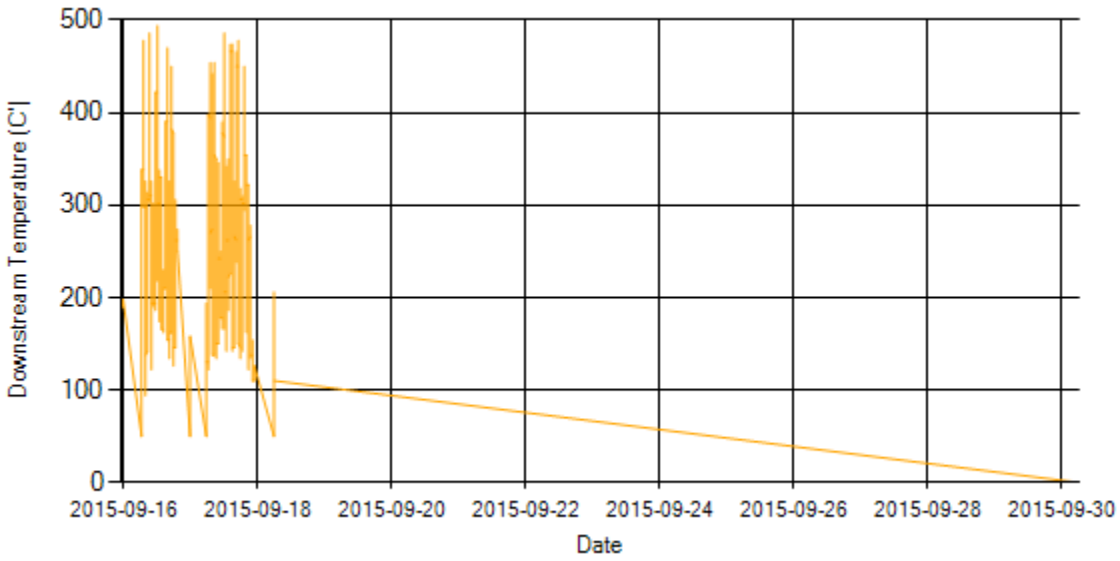


Figure 7- Temperature distribution over the period

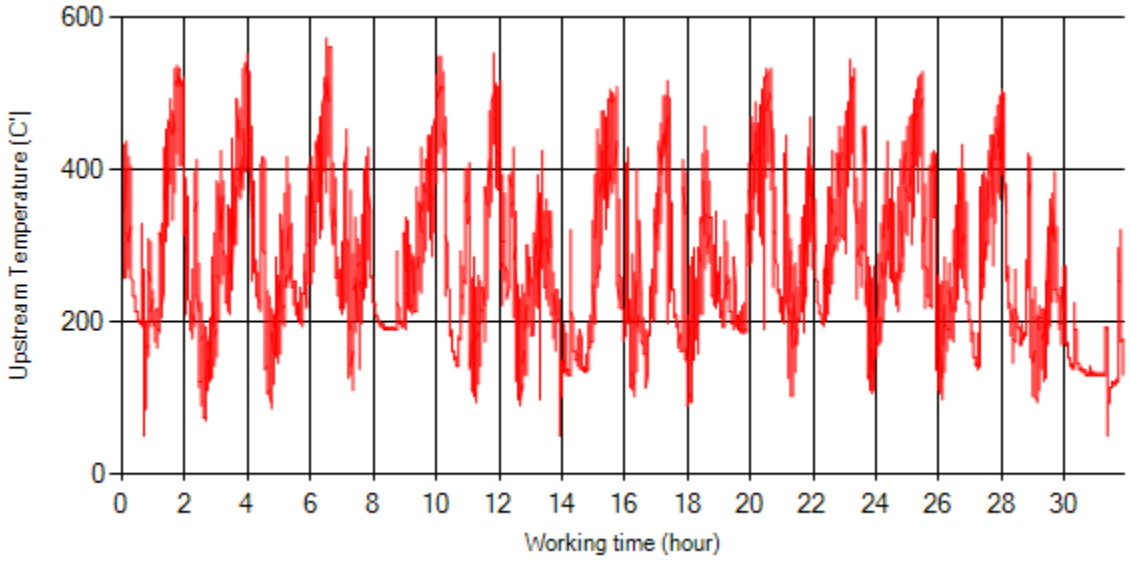


Figure 8- Temperature vs. working hours

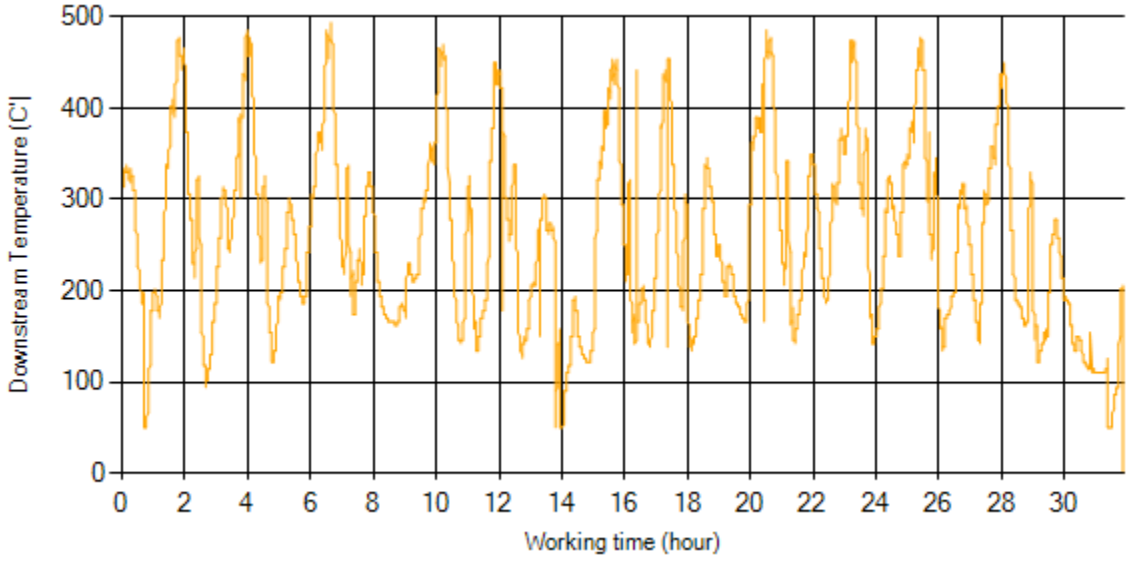


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

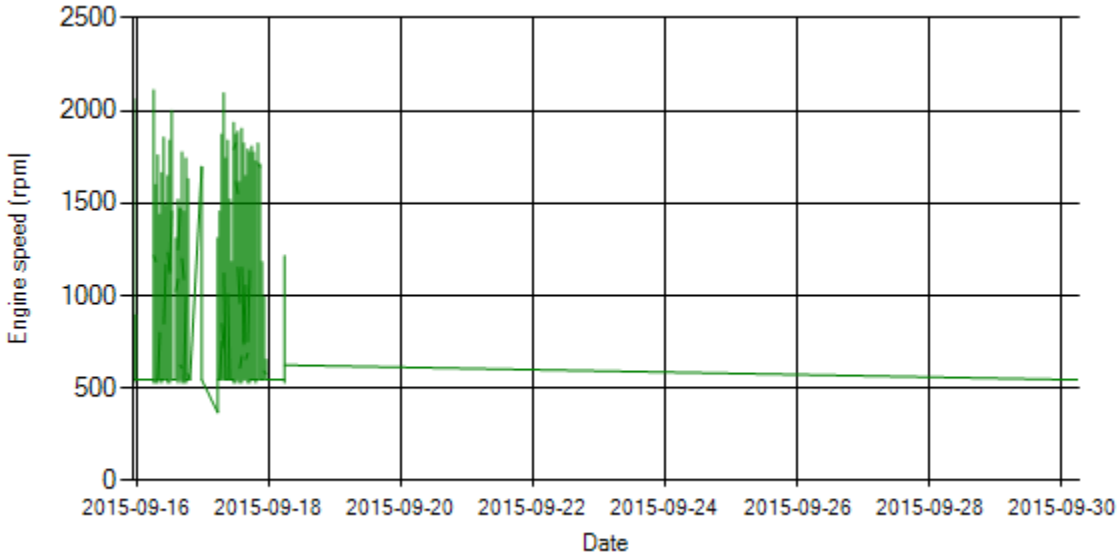


Figure 10- Engine speed distribution over the period

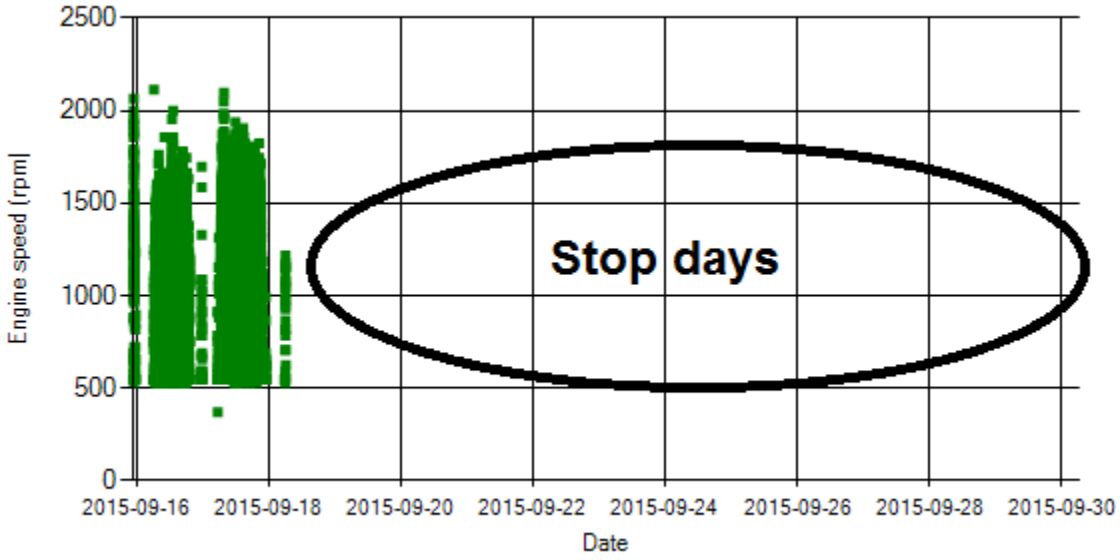


Figure 11- Engine speed diagram for calculating CPK's working days

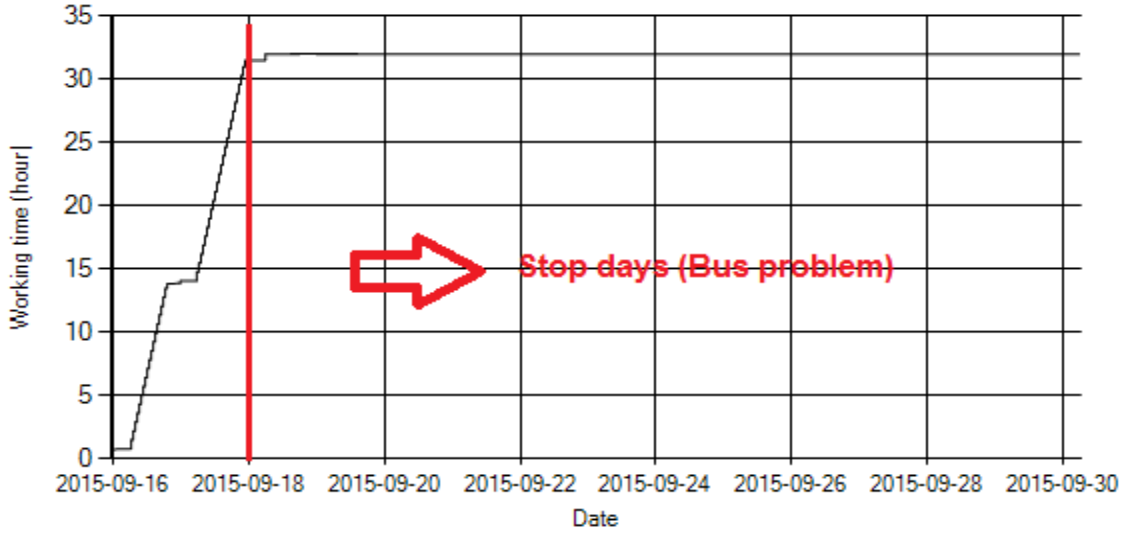


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

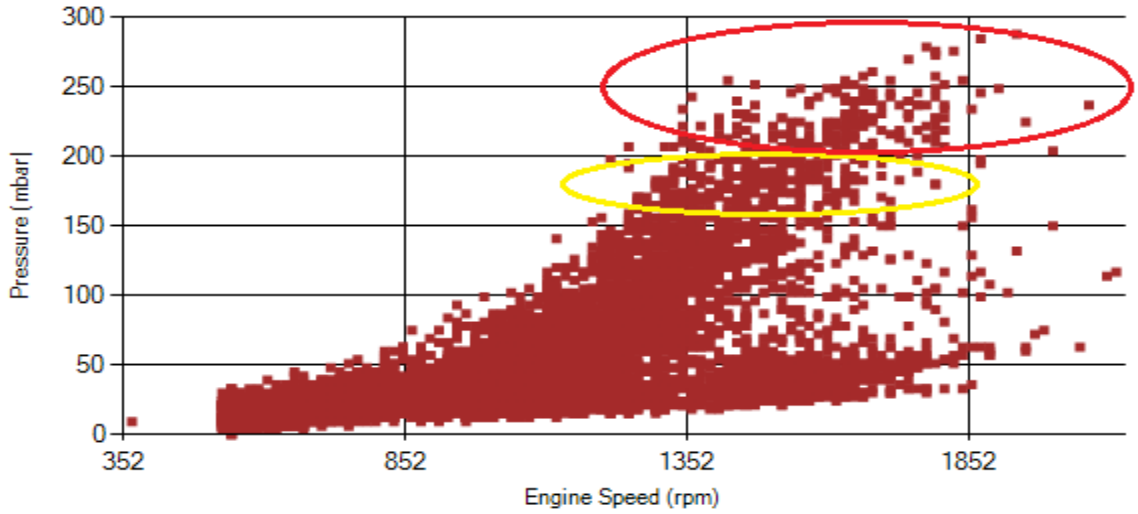


Figure 13- Pressure against engine speed

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

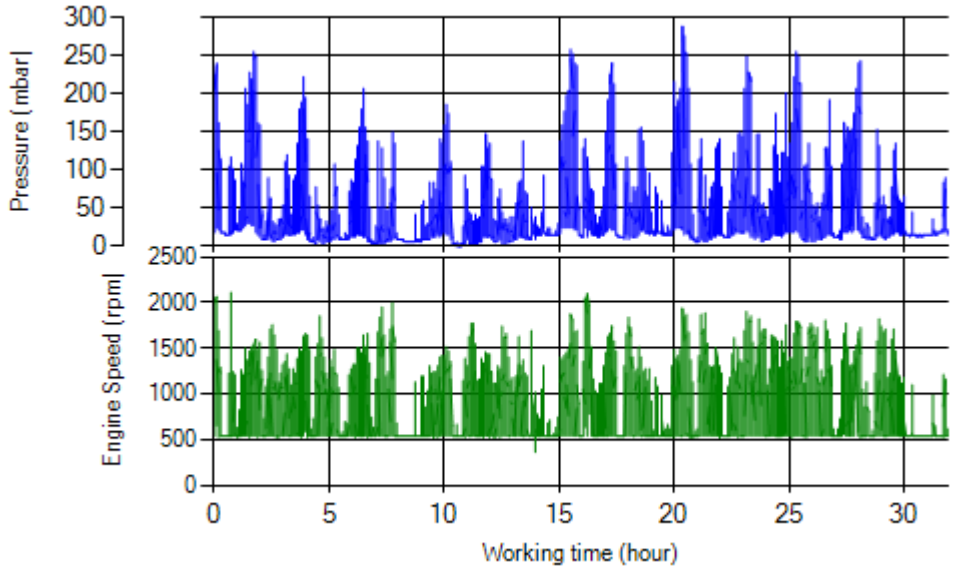


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

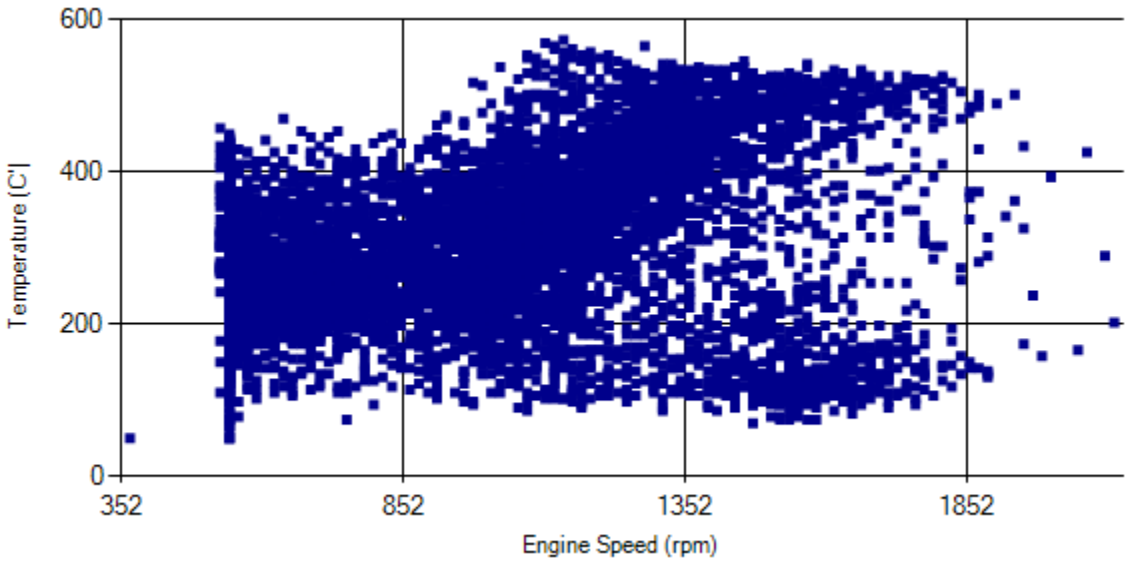


Figure 15- Temperature against engine speed

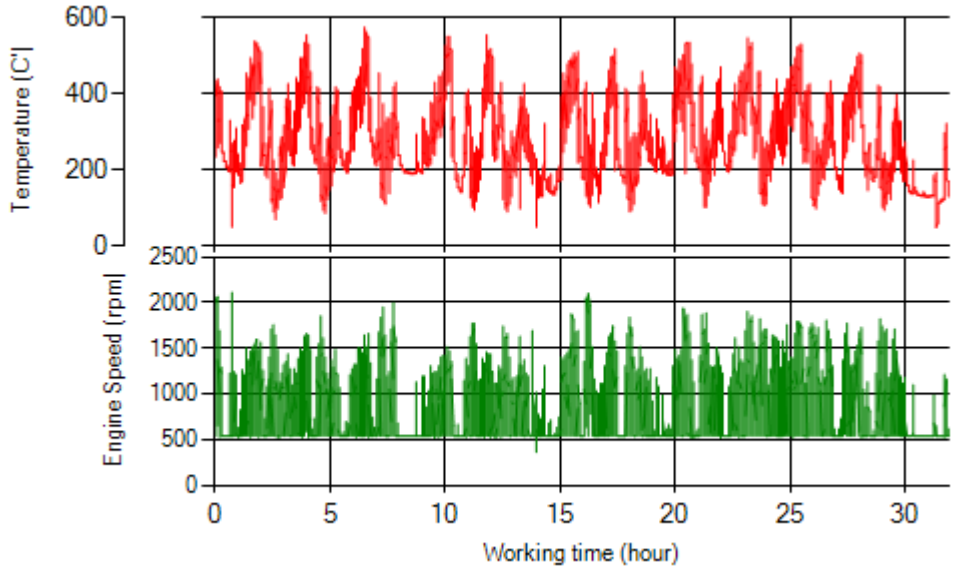


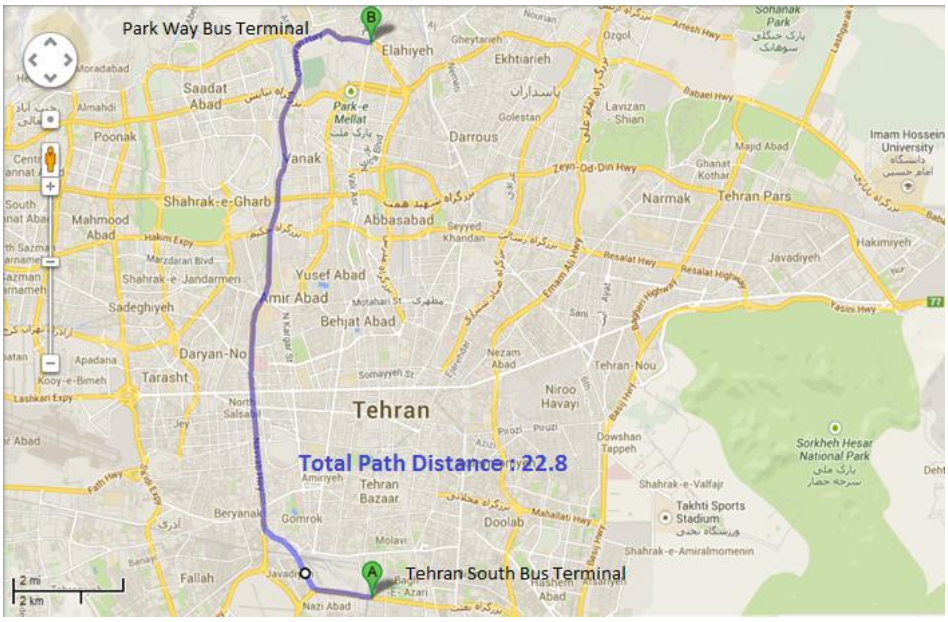
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 1.76% of working time pressure was above 200 mbar and only 4.76% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 14% of total working time, temperature is above 400 ℃ and 24% above 350℃.

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

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



Overall Information

Table1- Overall Information

Vehicle plate number	78524
CPK data logger number	LN: 001443, DN: 1930,Sim +989218786219
Bus line	Number 4 (south to north Bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	PURItech (Passive system with FBC)
Installation date	28/Jan/2015
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value – DPF upstream	1.90 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	33920 km
Bus mileage over the period	2493 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	175 hours 22 minutes
Average working hours per day (including stop days)	11 hours 41 minutes
Bus average speed	14.2 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1445 lit
Fuel consumption per hour	8.24 lit/hr
Average fuel consumption	0.58 lit/km
Total Bus additive consumption over the period	0.700 lit
Average additive consumption	280 cc/km
Additive consumption to fuel ration	485 cc/1000lit

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

Temperature, Pressure and Engine Speed Overview

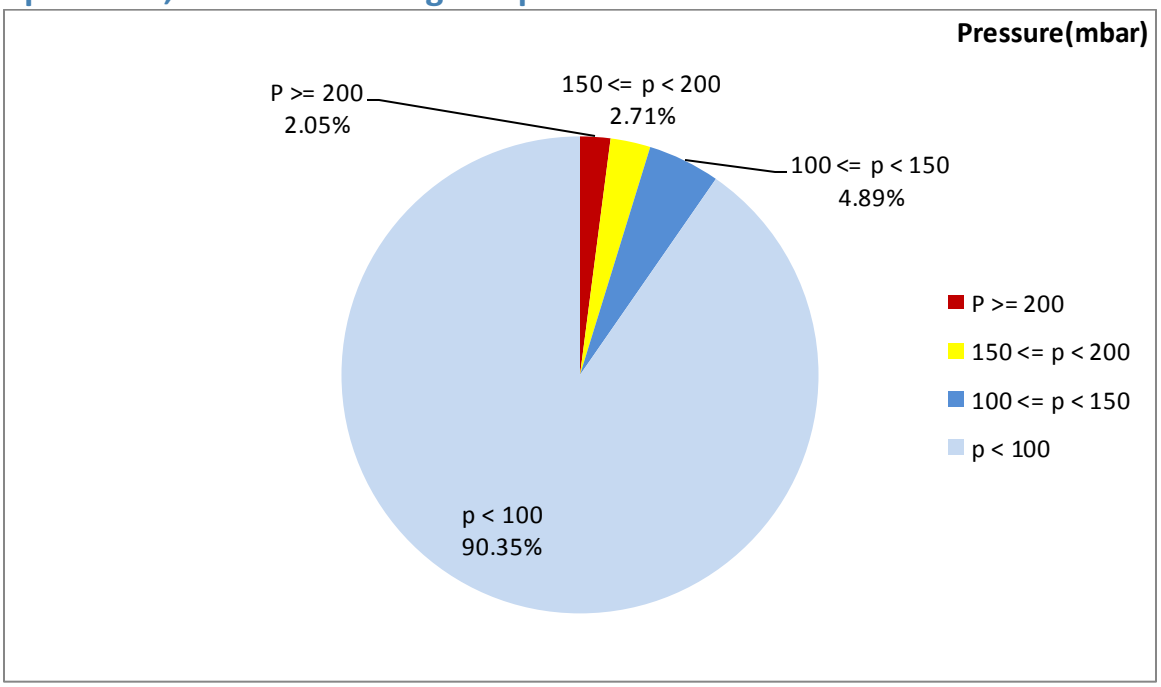


Figure 1- Pressure distribution over the working hours

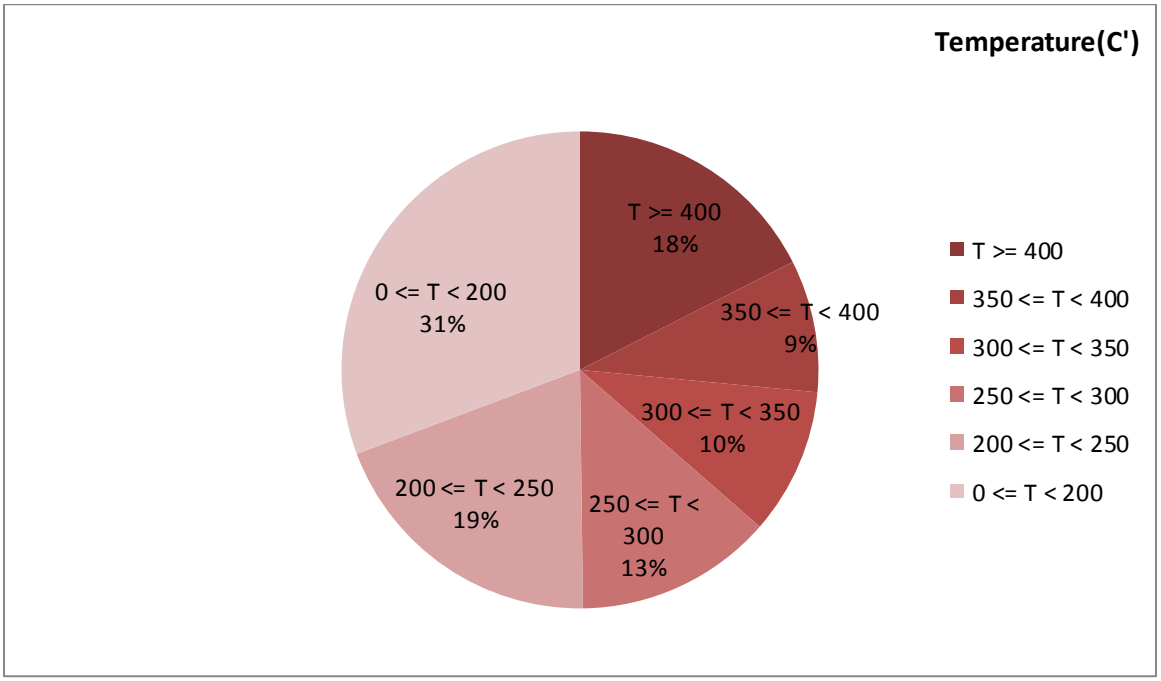


Figure 2-Temperature distribution over the working hours

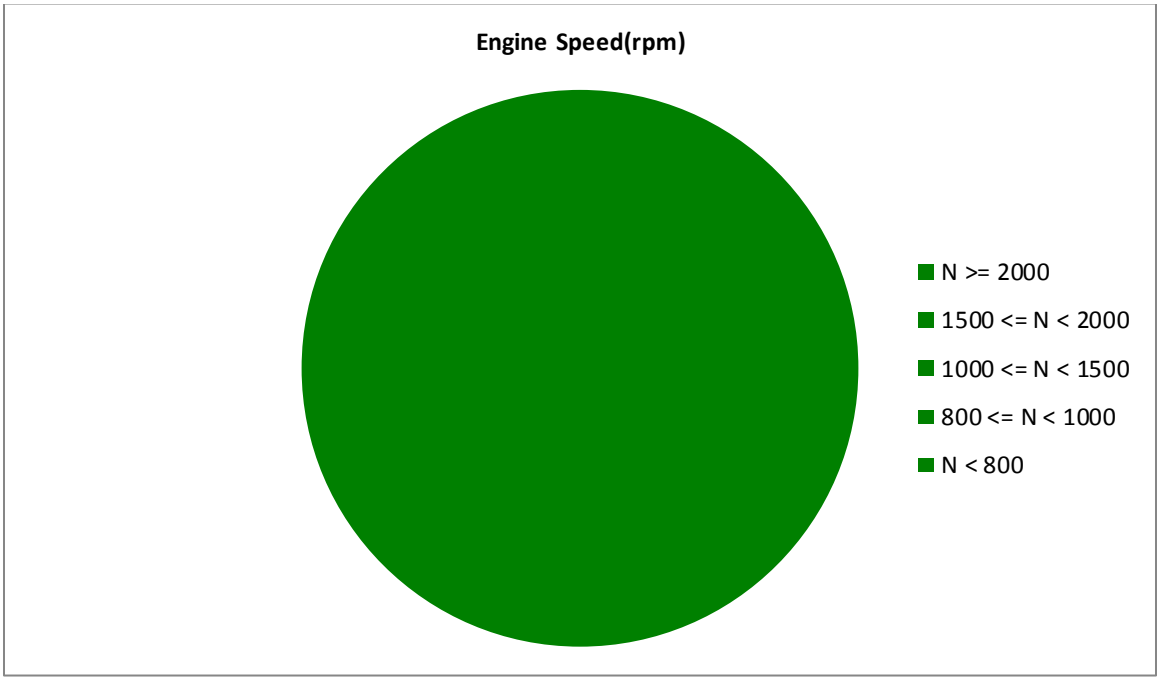


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
278.27	38.06	-

Table 5- Mean values without idling

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

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
750-50	342-0	-

Notice: Due to data logger technical problem, rpm sensor data missed. So engine speed's related parameters were left blank.

Detailed Pressure Analysis

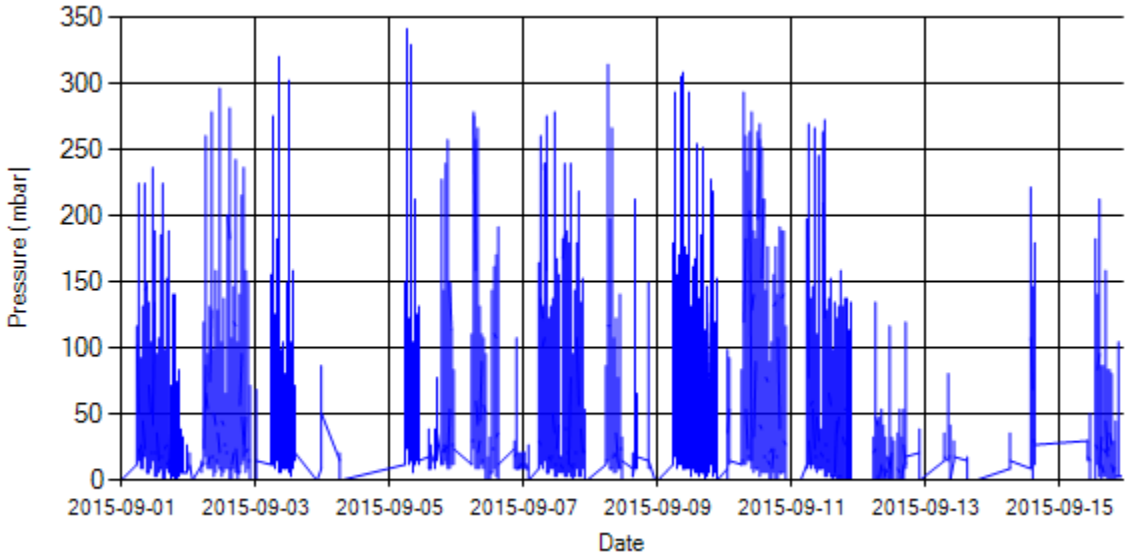


Figure 4- Pressure distribution over the period

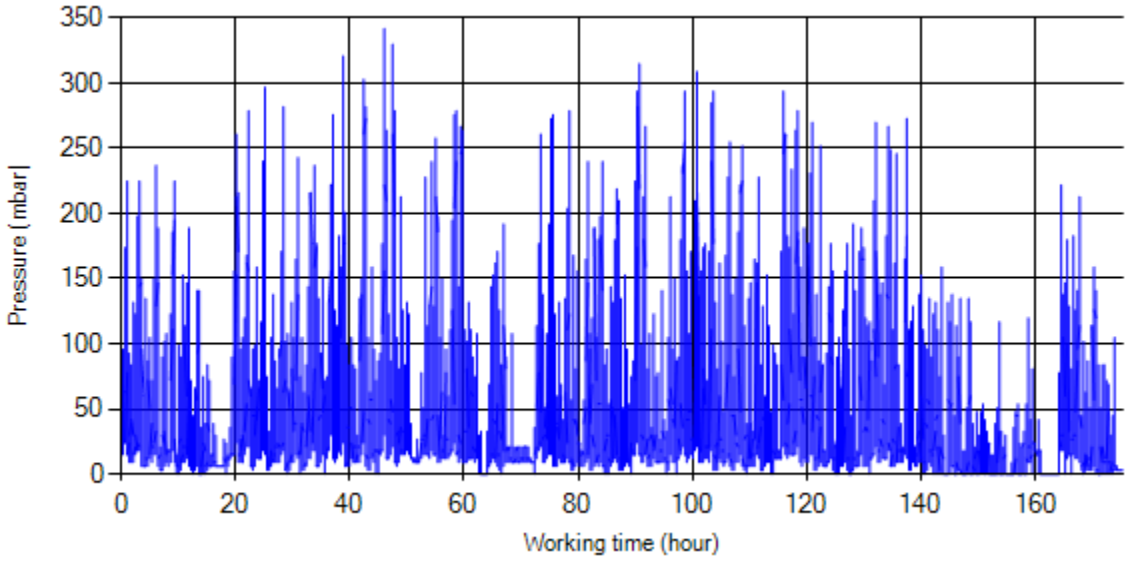


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

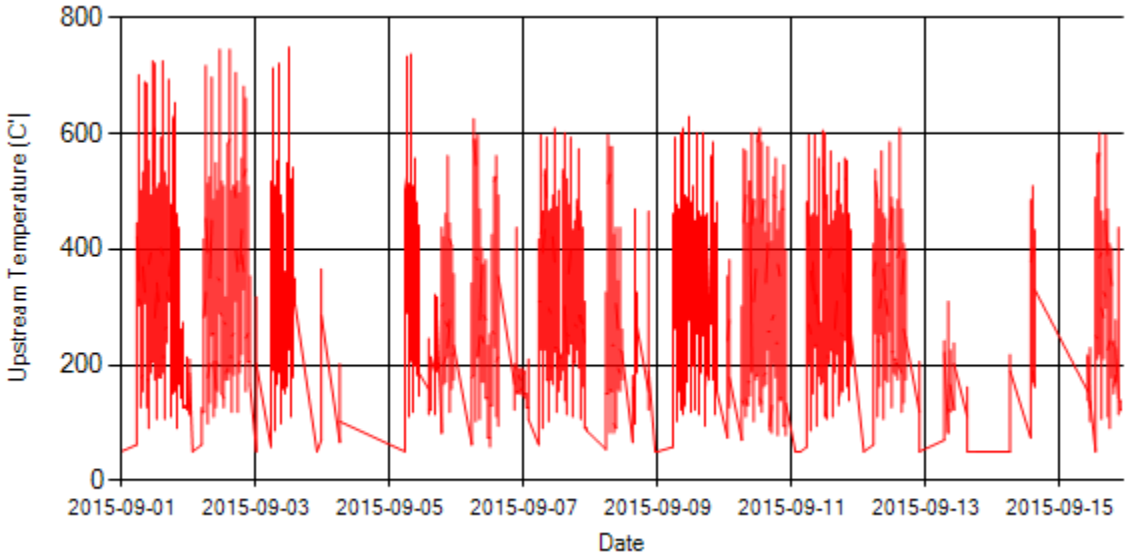


Figure 6- Temperature distribution over the period

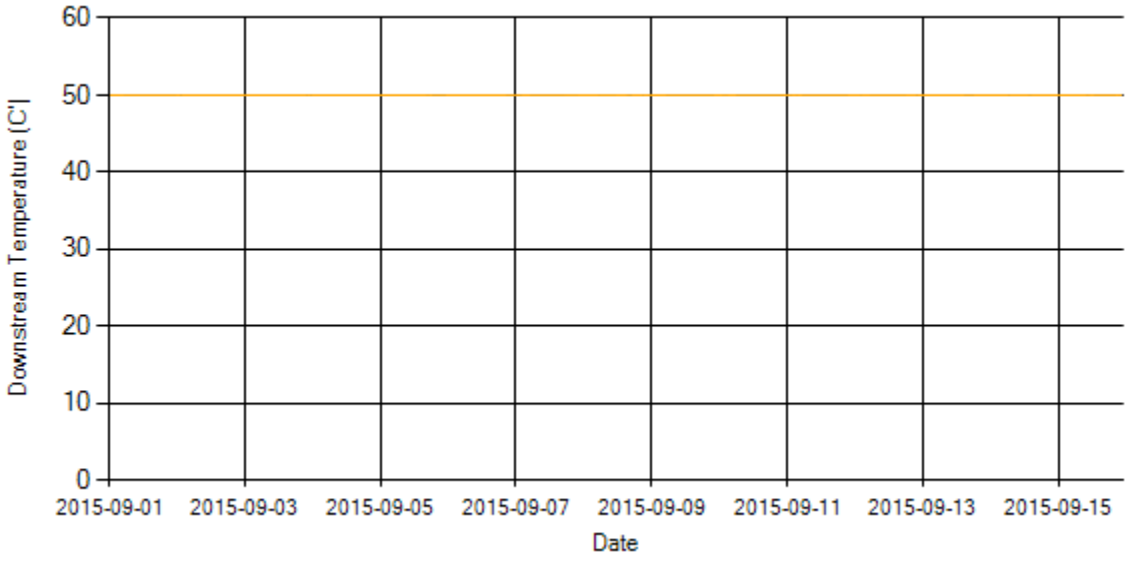


Figure 7- Temperature distribution over the period

Notice: Temperature 2 sensor was shoving constant value due to data logger problem.

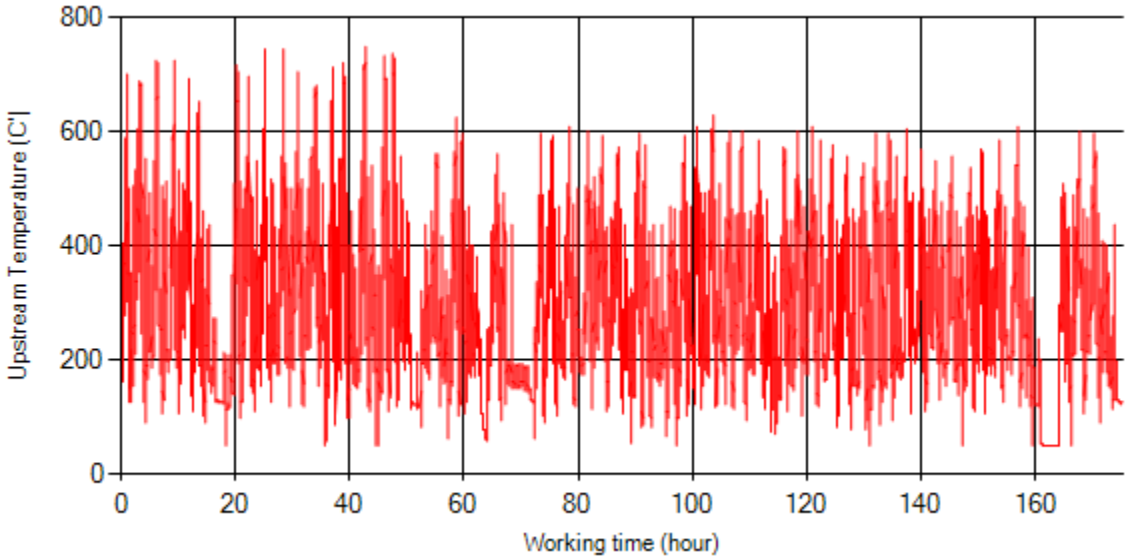


Figure 8- Temperature vs. working hours

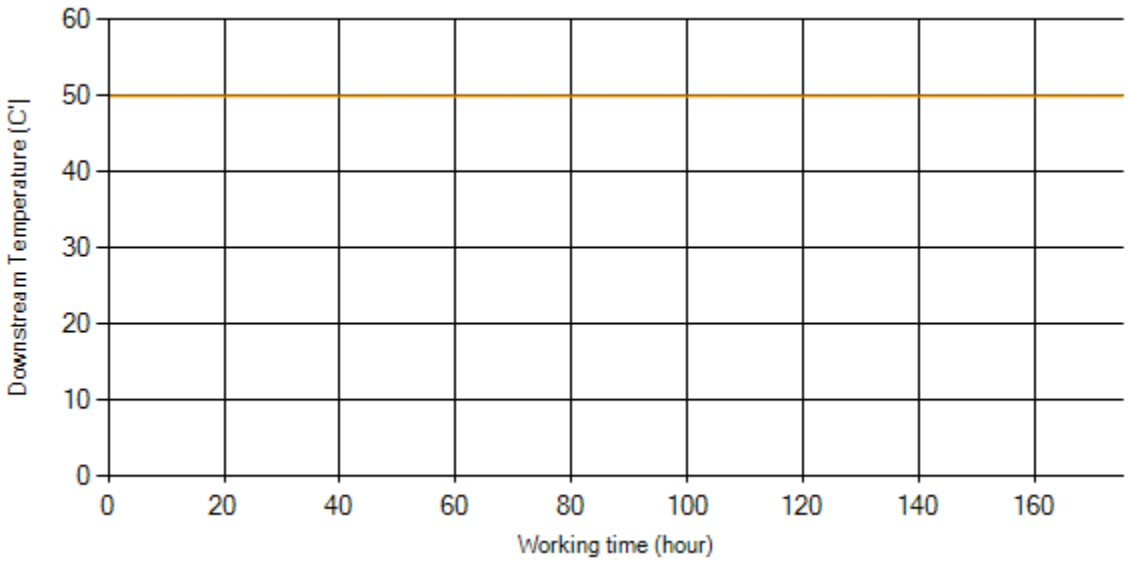


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

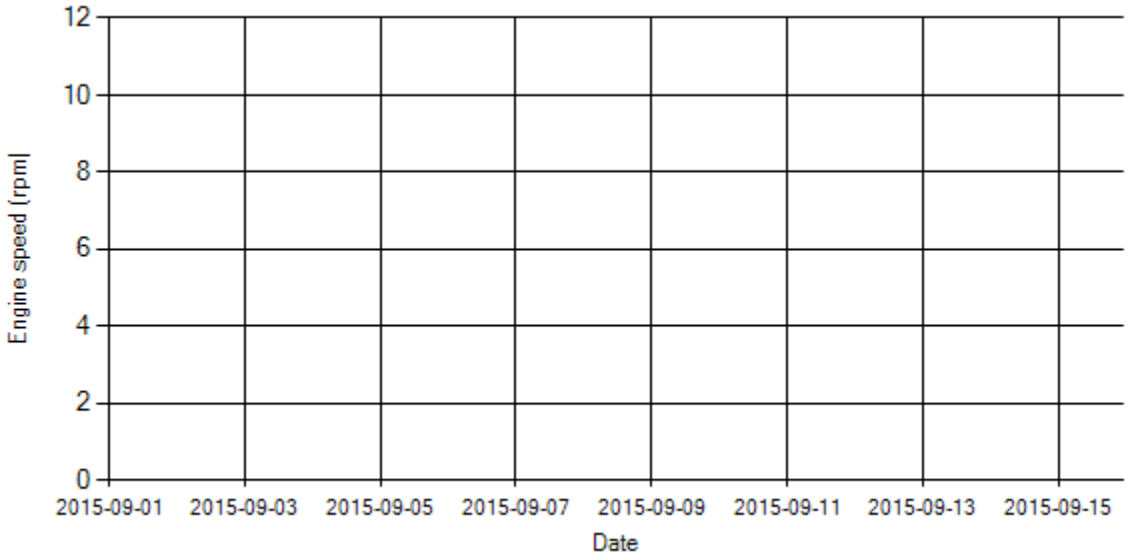


Figure 10- Engine speed distribution over the period

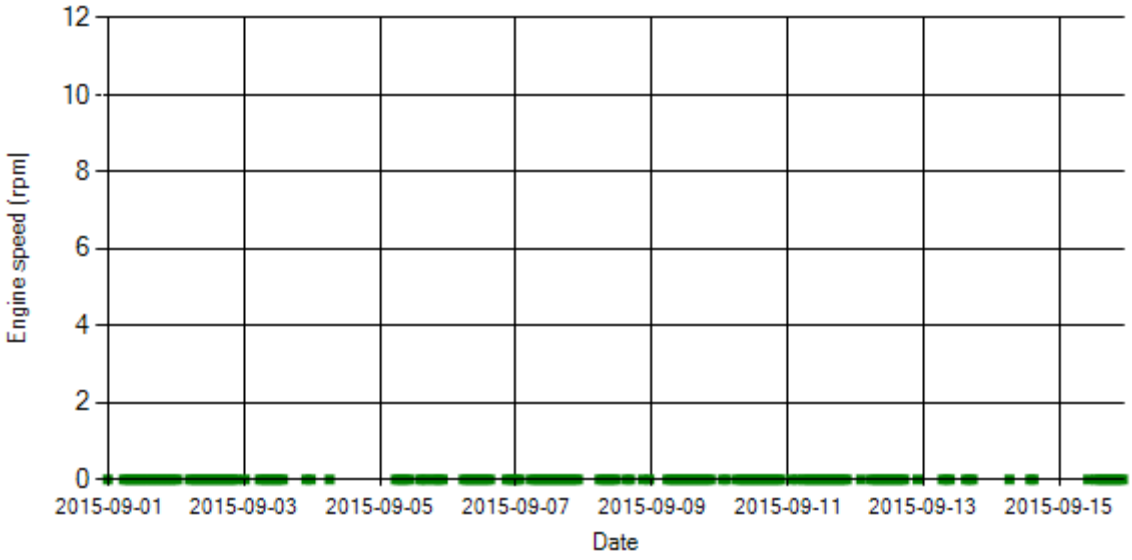


Figure 11- Engine speed diagram for calculating CPK's working days

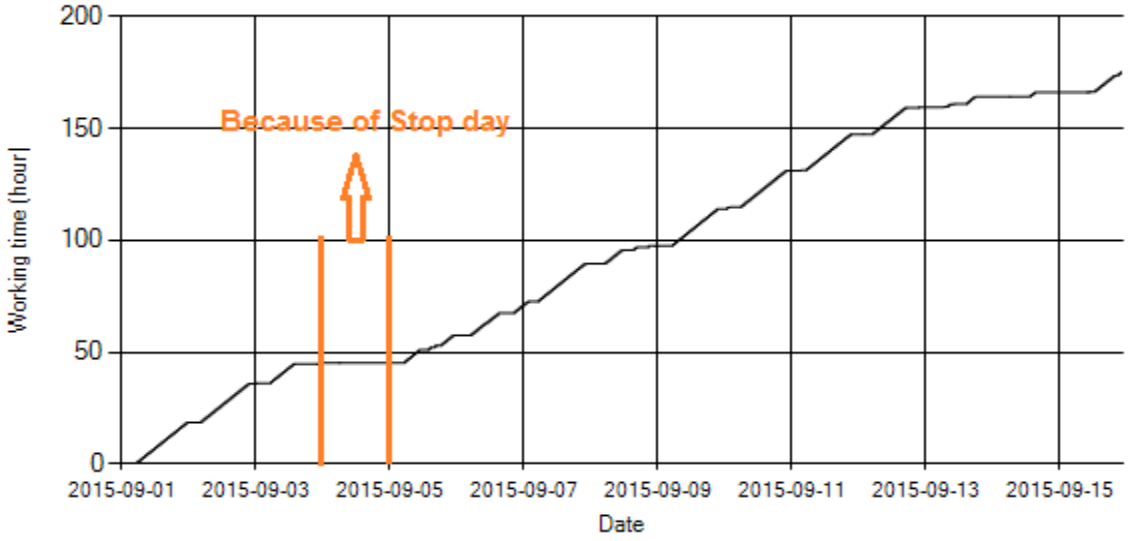


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, Sep 4th was stop day.

Pressure-Engine Speed diagrams

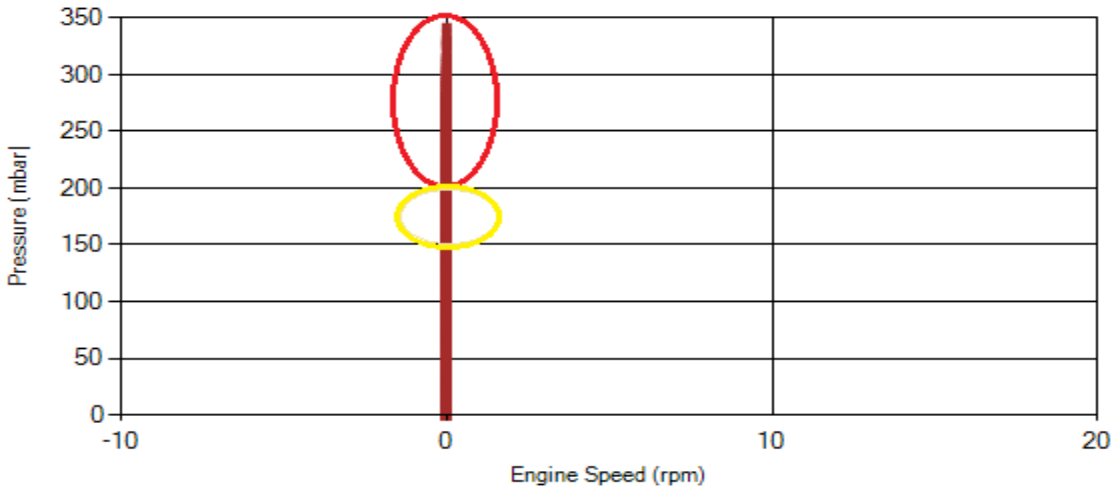


Figure 13- Pressure against engine speed

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

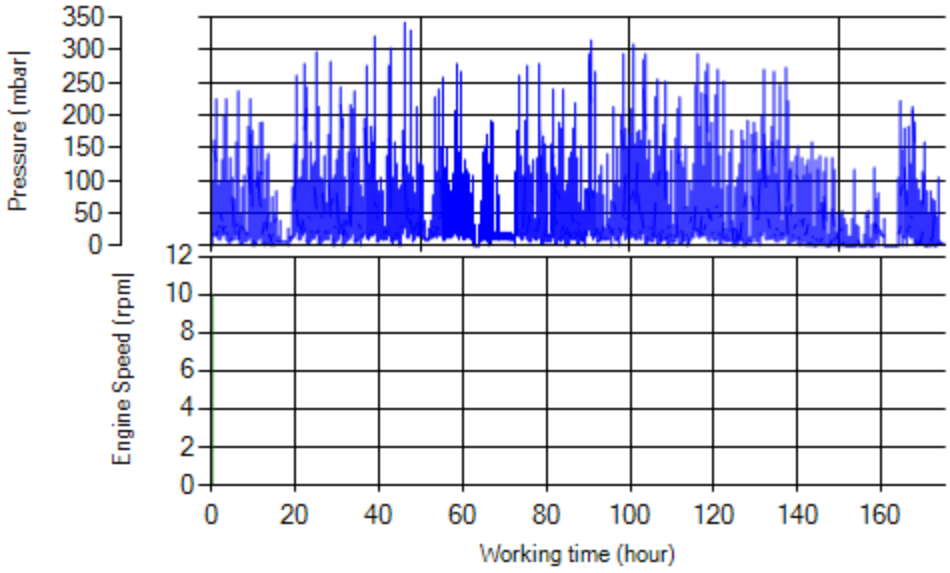


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

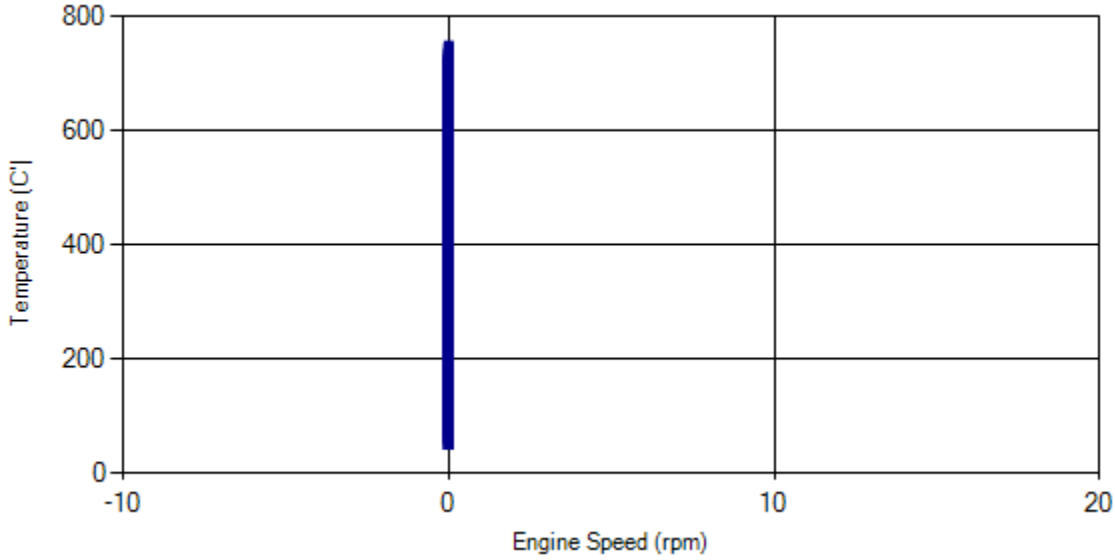


Figure 15- Temperature against engine speed

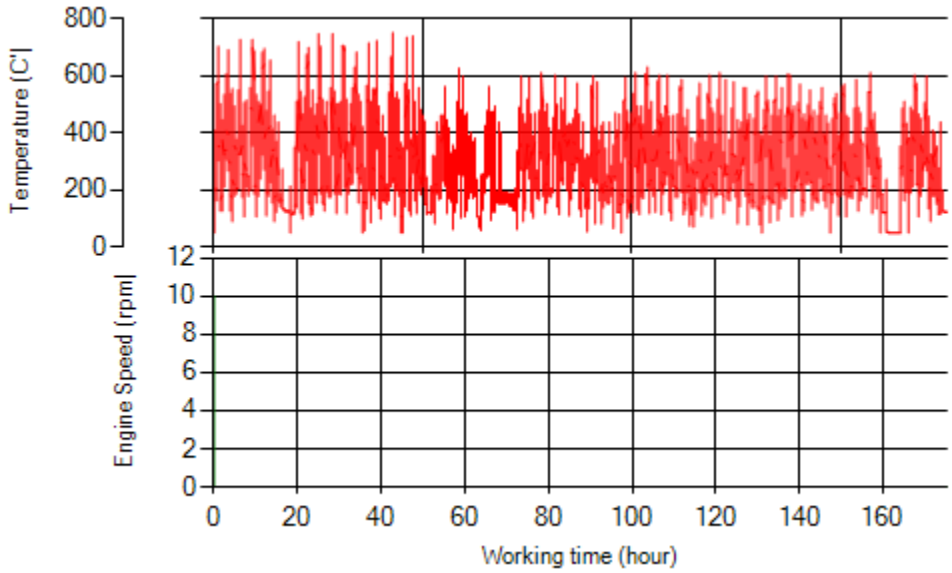


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 2.05% of total working time pressure is above 200 mbar and 4.76% above 150mbar.
- Figure 2 displays flow temperature before the DPF. It can be obviously observed that 18% of total working time temperature is above 400 °C and 27% above 350°C. Back pressure rise had important effect on increasing flow's temperature.

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

Overall Information

Table1- Overall Information

Vehicle plate number	78524
CPK data logger number	LN: 001443, DN: 1930,Sim +989218786219
Bus line	Number 4 (south to north Bus line)
Bus Terminals	Tehran South Bus Terminal - Park Way Bus Terminal
Total path distance	22.8 km
DPF producer company	PURItech (Passive system with FBC)
Installation date	28/Jan/2015
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value – DPF upstream	1.90 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF core was removed on Jul 22nd and was cleaned on Aug 12th for the first time. Considering system relatively high backpressure, filter isolation defect and air filter's deformation, DPF core was removed on Sep 16th and will be installed on system after cleaning and improving isolation system.
Dosing status	Dosing value has been kept constant from installation date until now.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	35728 km
Bus mileage over the period	1808 km
Working days over the period	10 days
Stop days	5 days
Data logger working days	8 days
Working hours over the period	138 hours 53 minutes
Average working hours per day (including stop days)	9 hours 15 minutes
Bus average speed	13.00 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1110 lit
Fuel consumption per hour	7.99 lit/hr
Average fuel consumption	0.61 lit/km
Total Bus additive consumption over the period	- lit
Average additive consumption	- cc/km
Additive consumption to fuel ration	- cc/1000lit

Notice: Due to some technical problem related to data logger, rpm data missed. So parameters like idling speed was left blank.
Notice: According to figure 12, data logger didn't sample on Sep 19th and 20th. So average two days working hours were added to total working hours.
Notice: DPF core was removed on Sep 16th and additive system was disconnected, so additive consumption during this period was insignificant.

Temperature, Pressure and Engine Speed Overview

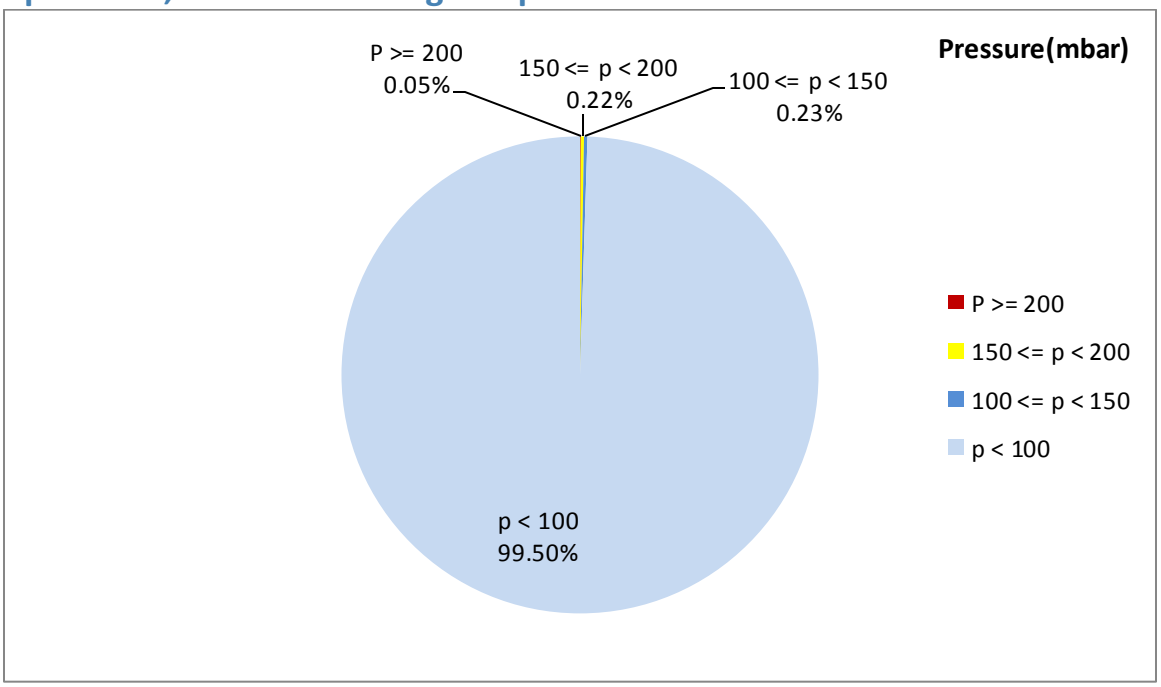


Figure 1- Pressure distribution over the working hours

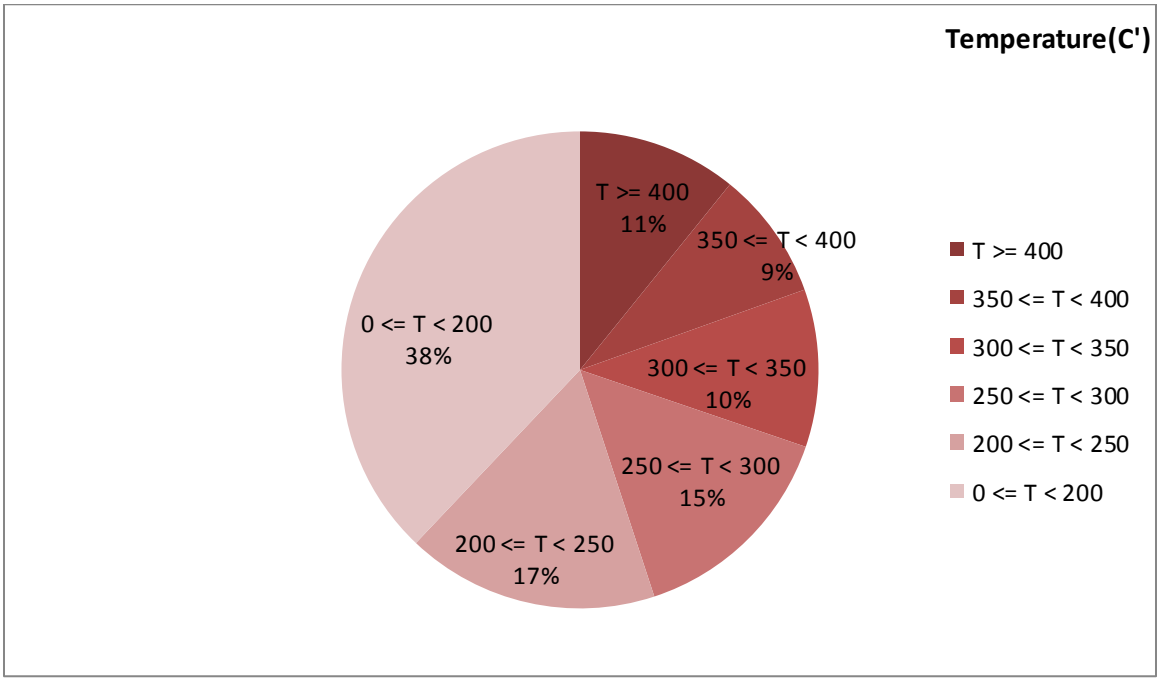


Figure 2-Temperature distribution over the working hours

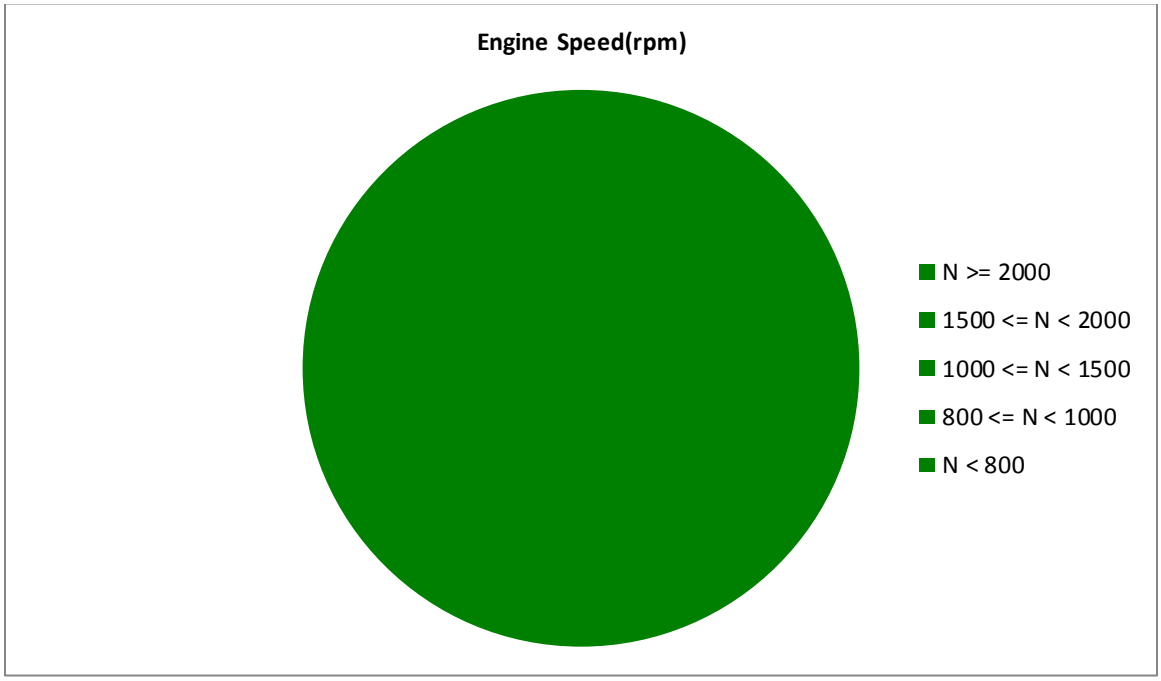


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
253.66	6.7	-

Table 5- Mean values without idling

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

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
586-50	222-0	-

Notice: Due to data logger technical problem, rpm sensor data missed. So engine speed's related parameters were left blank.

Detailed Pressure Analysis

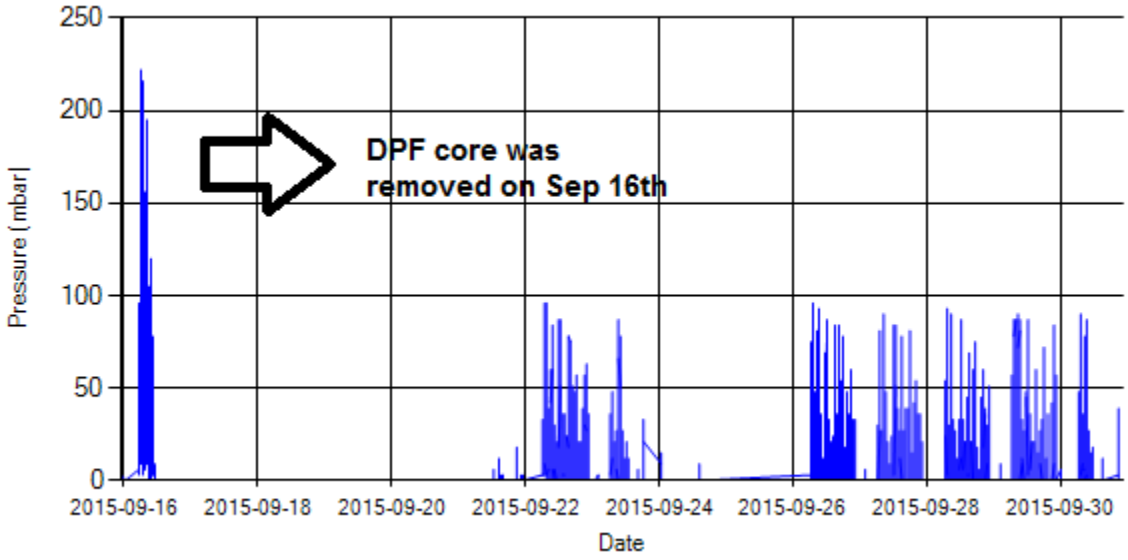


Figure 4- Pressure distribution over the period

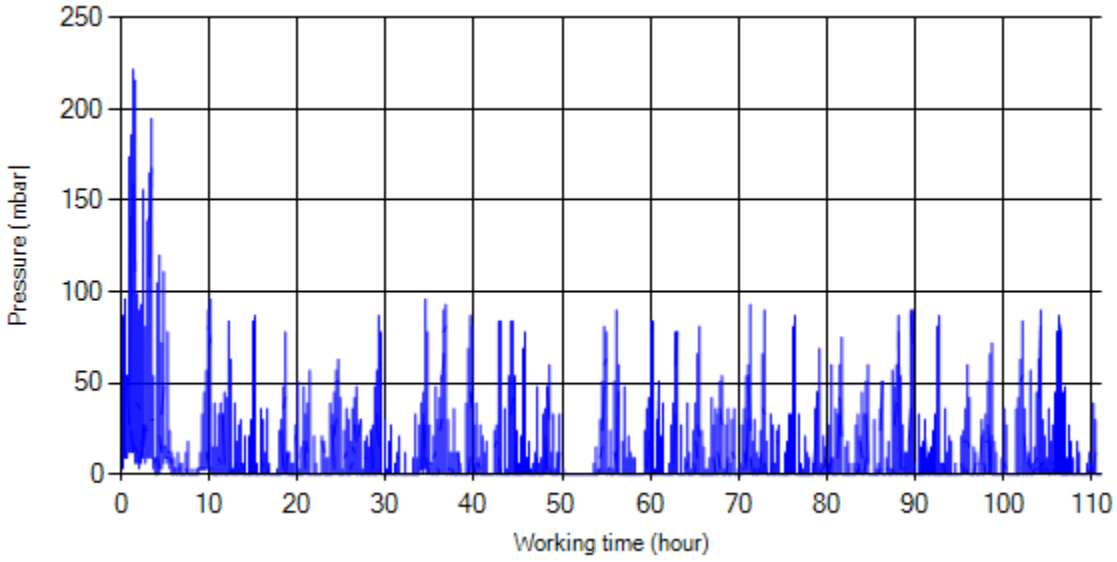


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

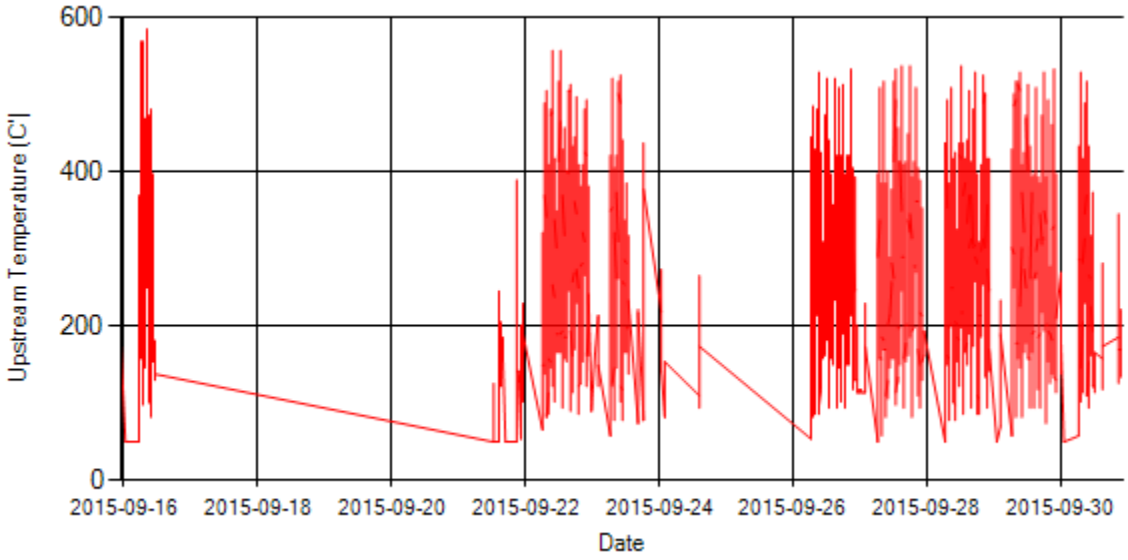


Figure 6- Temperature distribution over the period

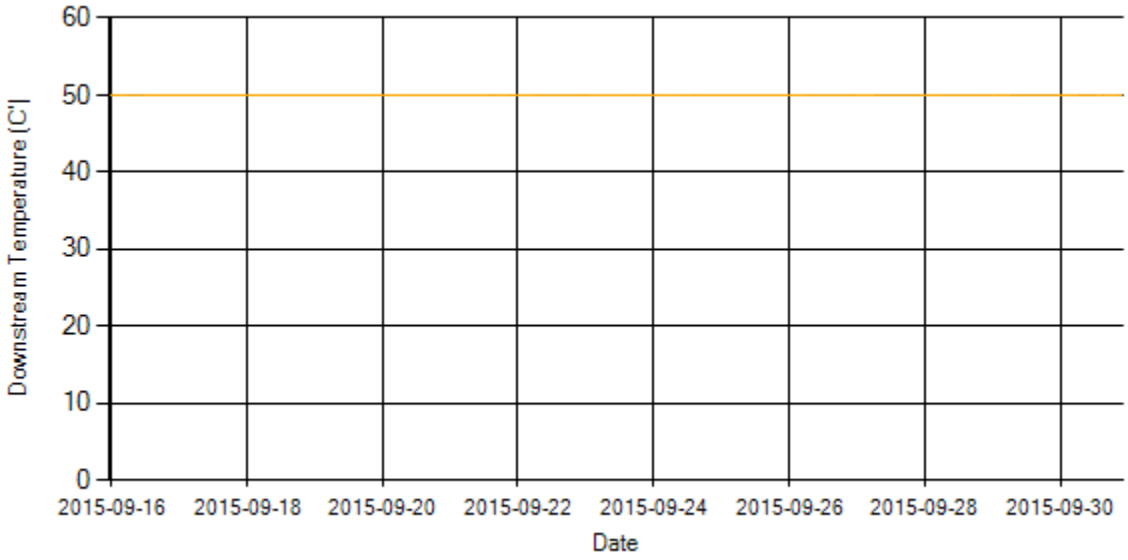


Figure 7- Temperature distribution over the period

Notice: Temperature 2 sensor was shoving constant value due to data logger problem.

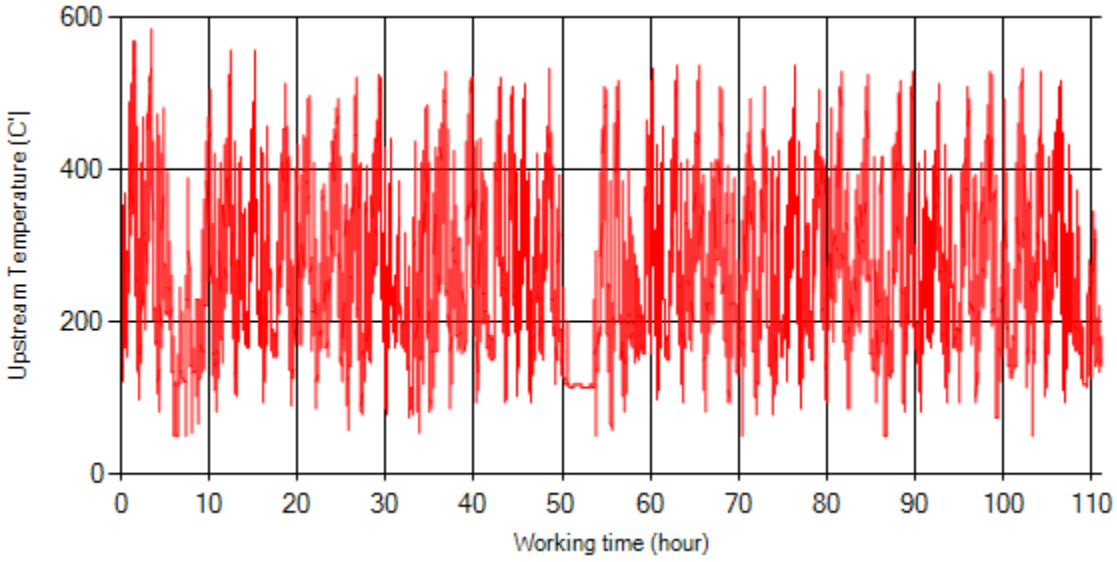


Figure 8- Temperature vs. working hours

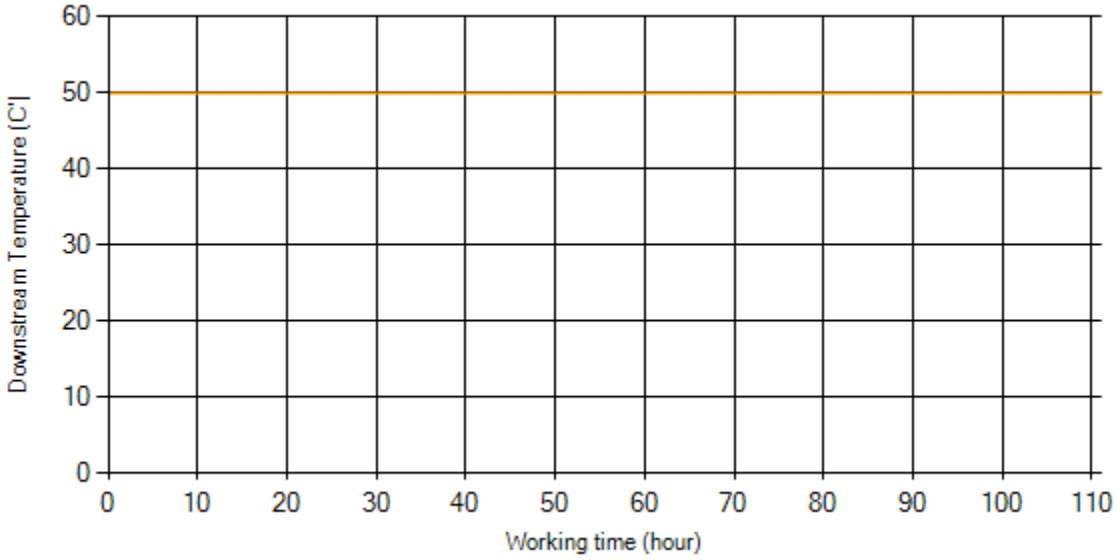


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

Figure 10- Engine speed distribution over the period

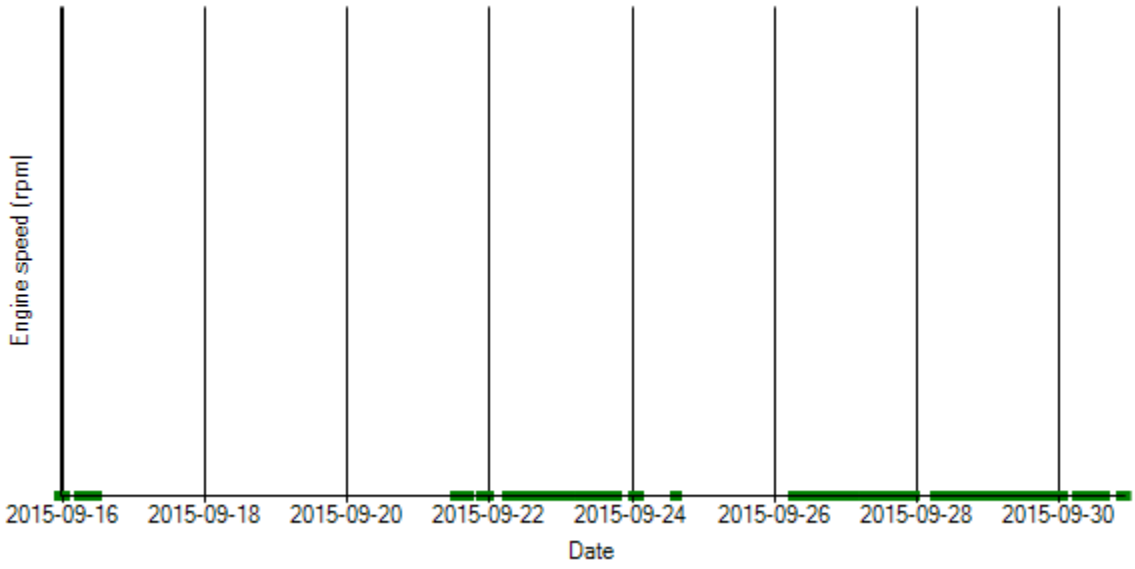


Figure 11- Engine speed diagram for calculating CPK's working days

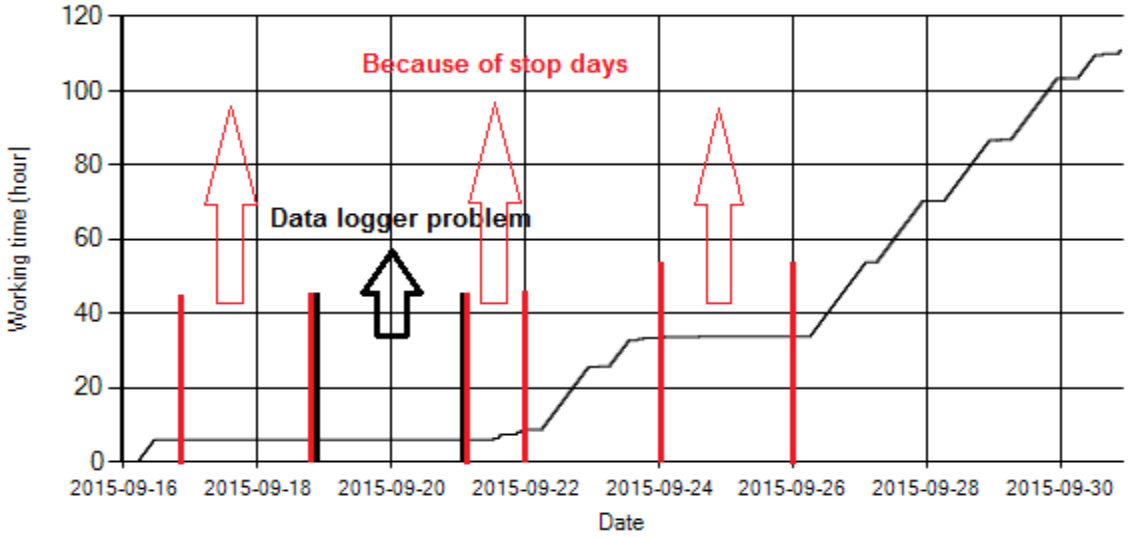


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

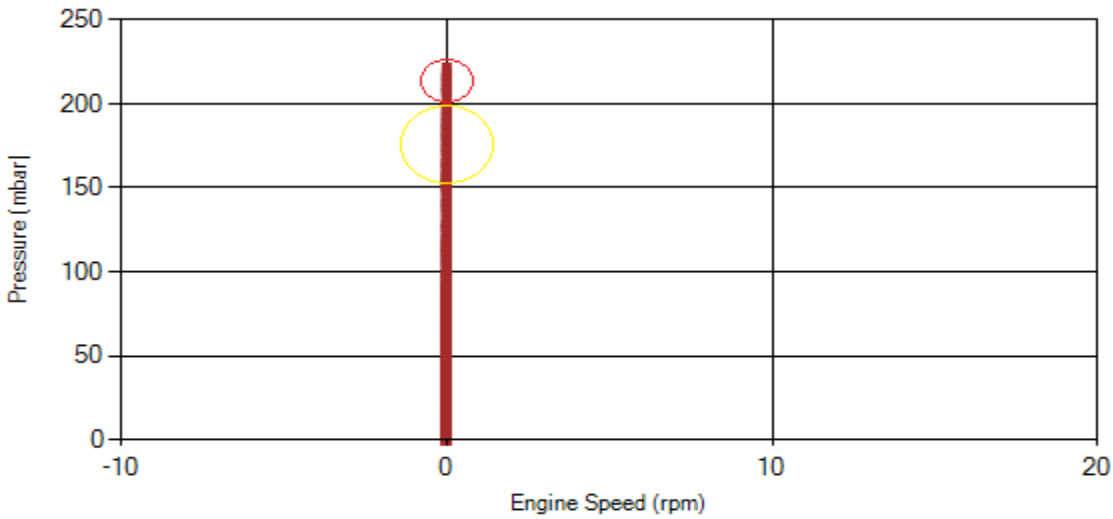


Figure 13- Pressure against engine speed

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

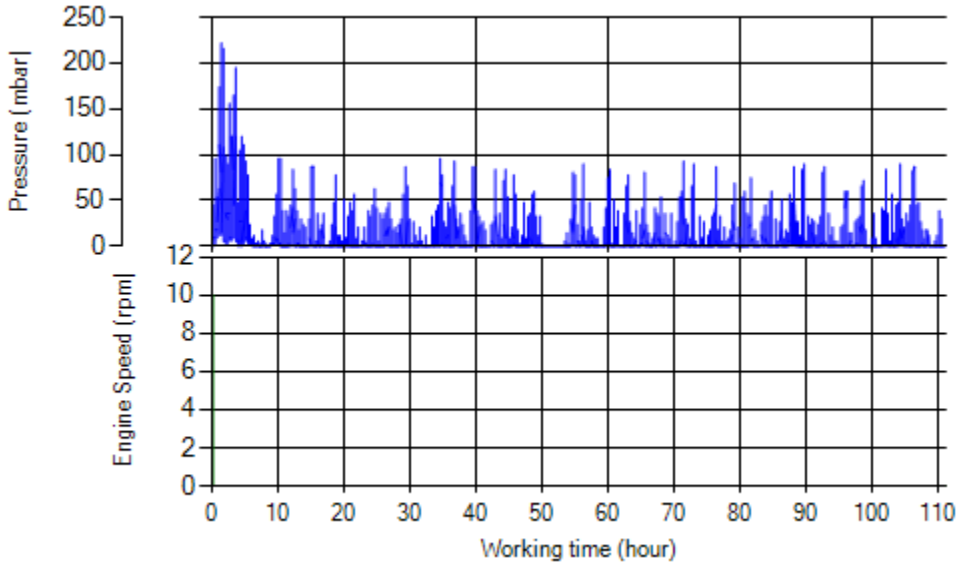


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

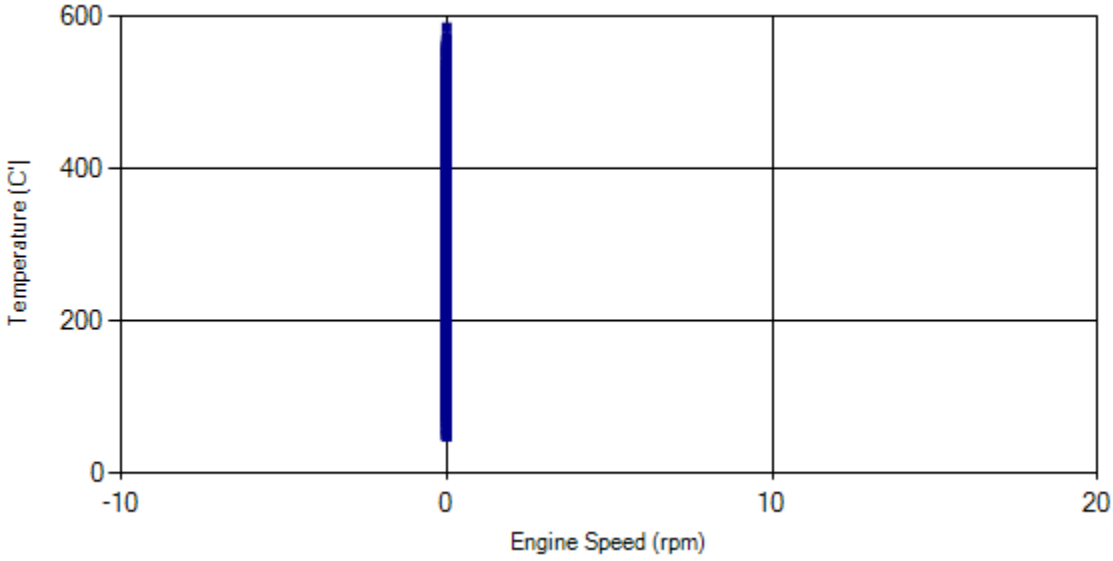


Figure 15- Temperature against engine speed

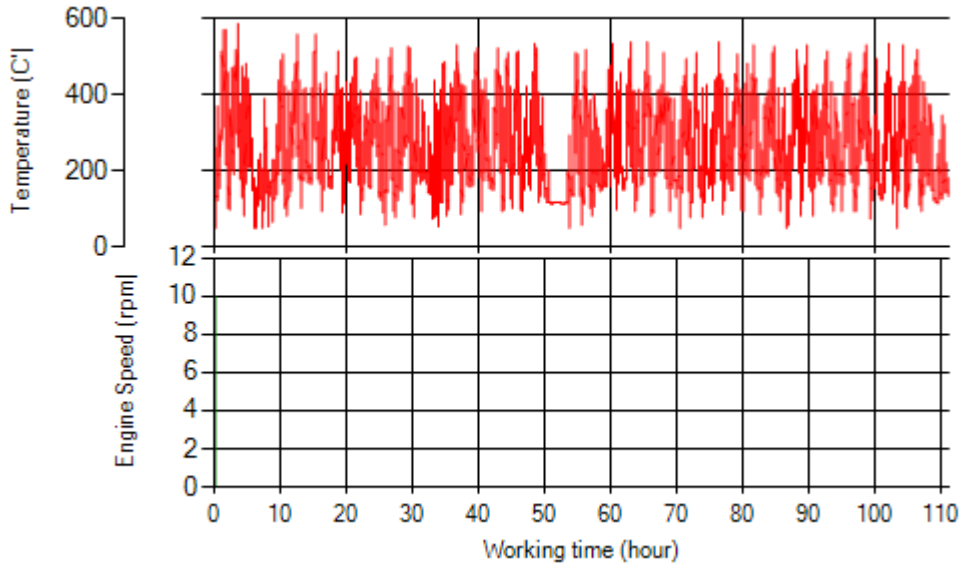


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

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

- It is worth-mentioning DPF isolation was not suitable and air filter melted because of very high temperature distribution.
- For decreasing destructive effect of increasing temperature, special heat shield was designed and DPF will be installed on system after cleaning with designed heat shield.

Appendix

Figure 1. Unsuitable filter isolation

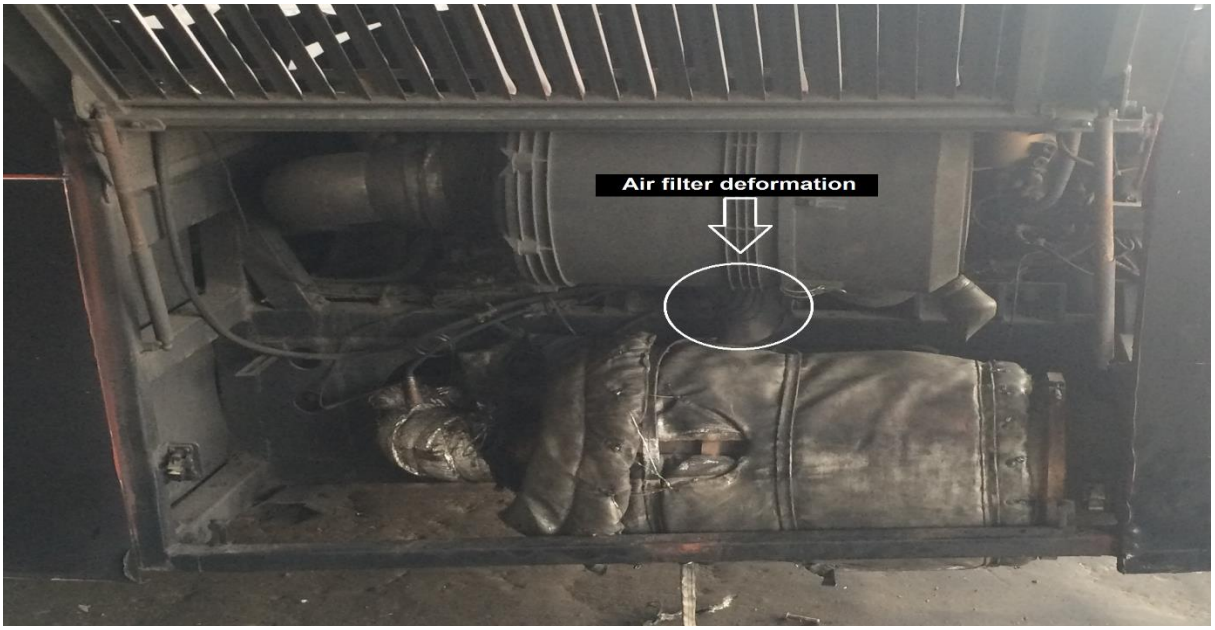
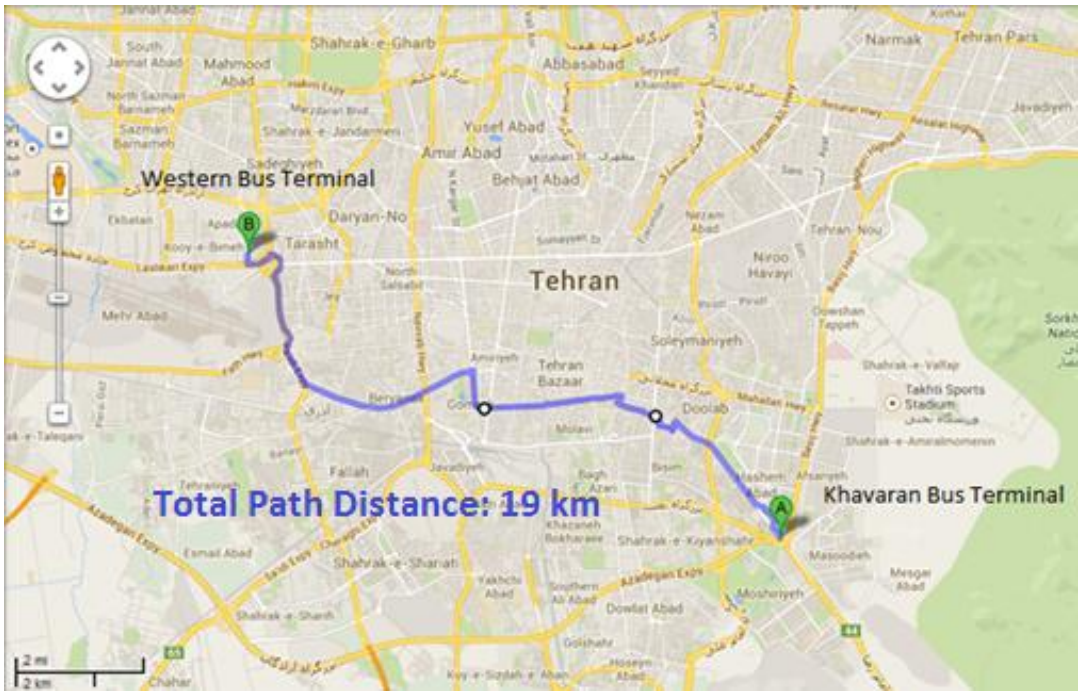


Figure 2. Air filter deformation, due to high temperature and filter unsuitable isolation

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



Overall Information

Table1- Overall Information

Vehicle plate number	33572 (28958)
CPK data logger number	LN: 001521, DN: 1995, Sim Number +989218469643
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF producer company	HJS_03 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	29408 km
Bus mileage over the period	1974 km
Working days over the period	14 days
Stop days	1 day
Data logger working days	14 days
Working hours over the period	134 hours 58 minutes
Average working hours per day (including stop days)	8 hours 60 minutes
Bus average speed	14.62 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	1265 lit
Fuel consumption per hour	9.37 lit/hr
Average fuel consumption	0.64 lit/km
Total Bus additive consumption over the period	0.530 lit
Average additive consumption	270 cc/km
Additive consumption to fuel ration	420 cc per 1000 lit (batch dosing with tank level)

Notice: Idle speed time information missed due to rpm sensor problem.

Temperature, Pressure and Engine Speed Overview

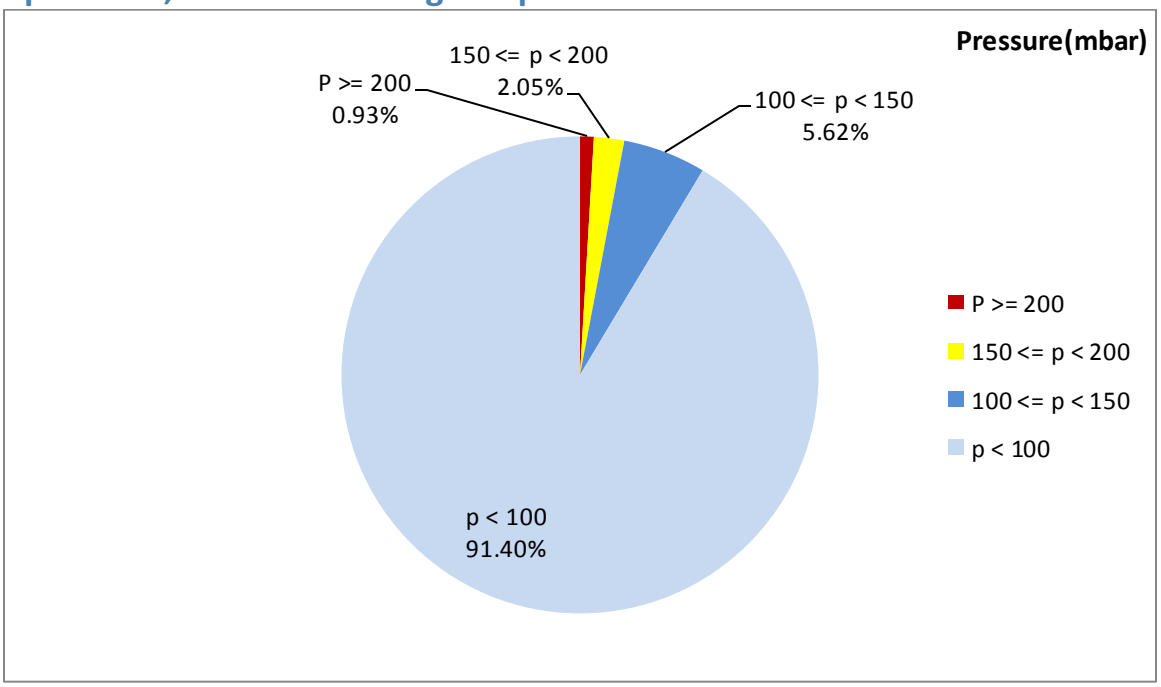


Figure 1- Pressure distribution over the working hours

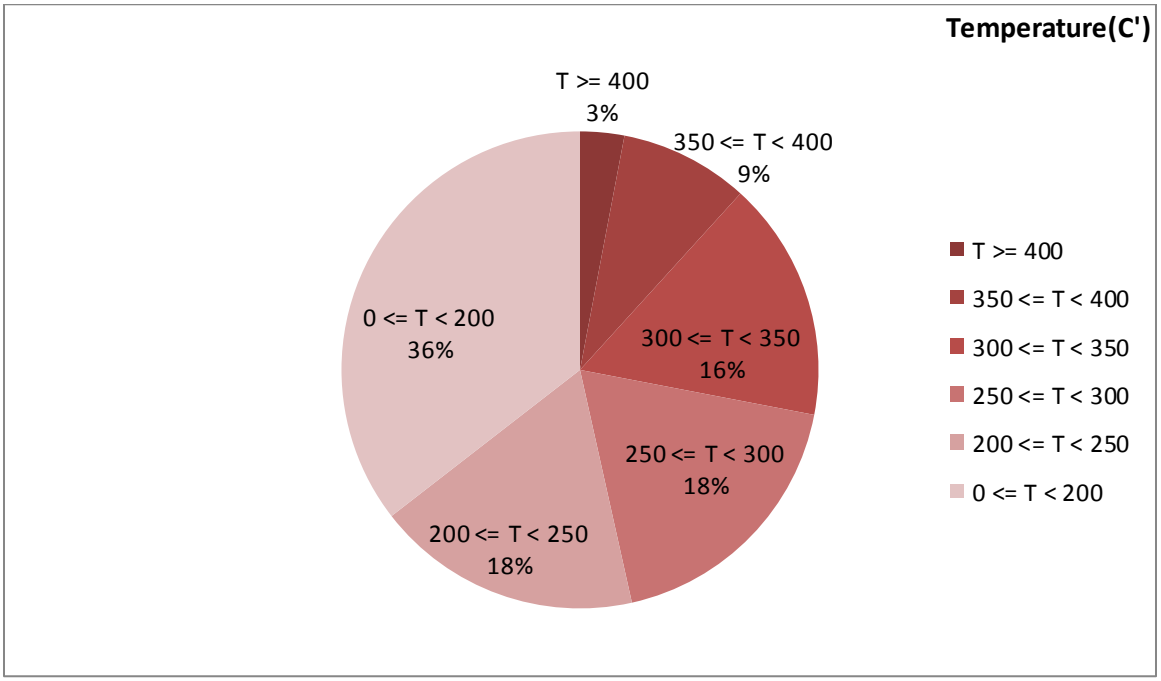


Figure 2-Temperature distribution over the working hours

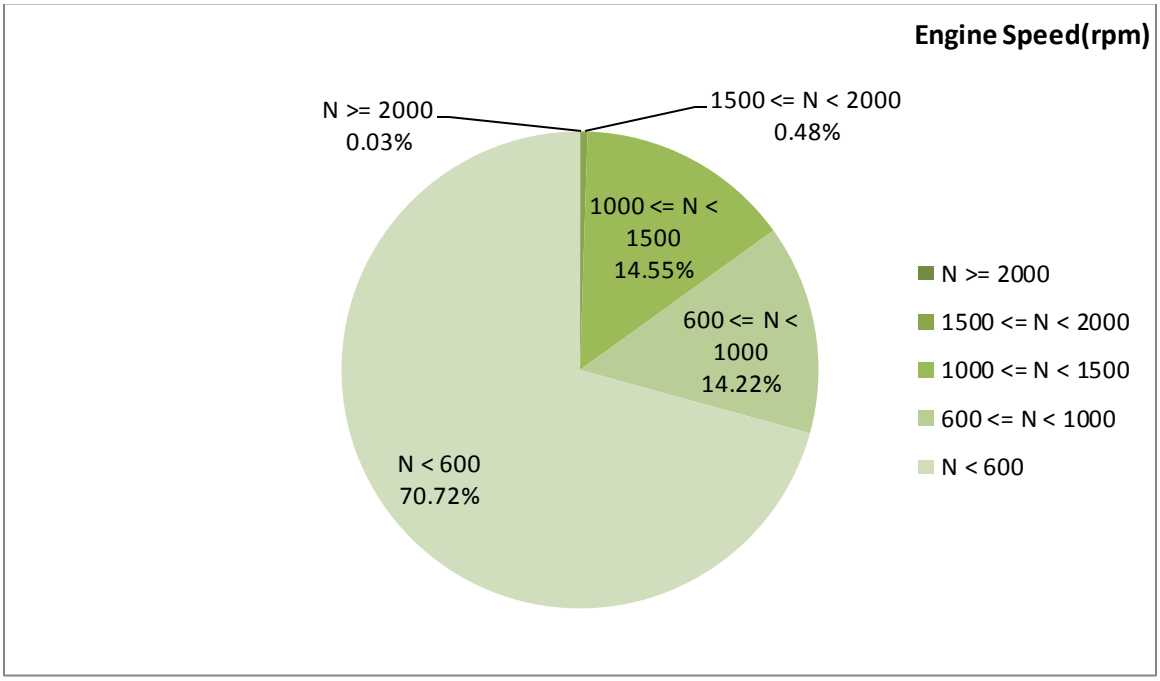


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
236.64	35.94	-

Table 5- Mean values without idling

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

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
542-50	423-0	-

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

Detailed Pressure Analysis

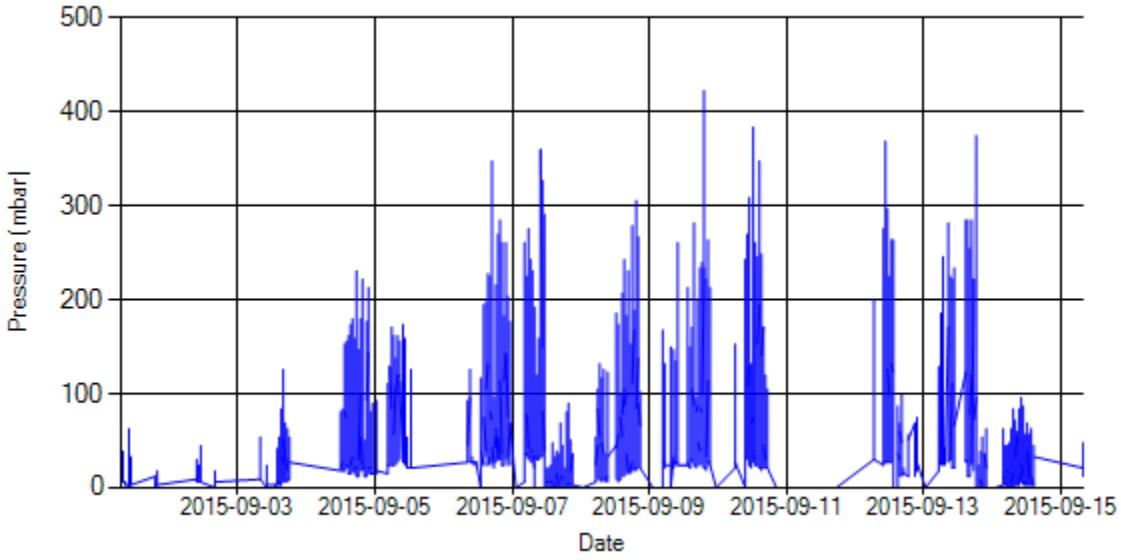


Figure 4- Pressure distribution over the period

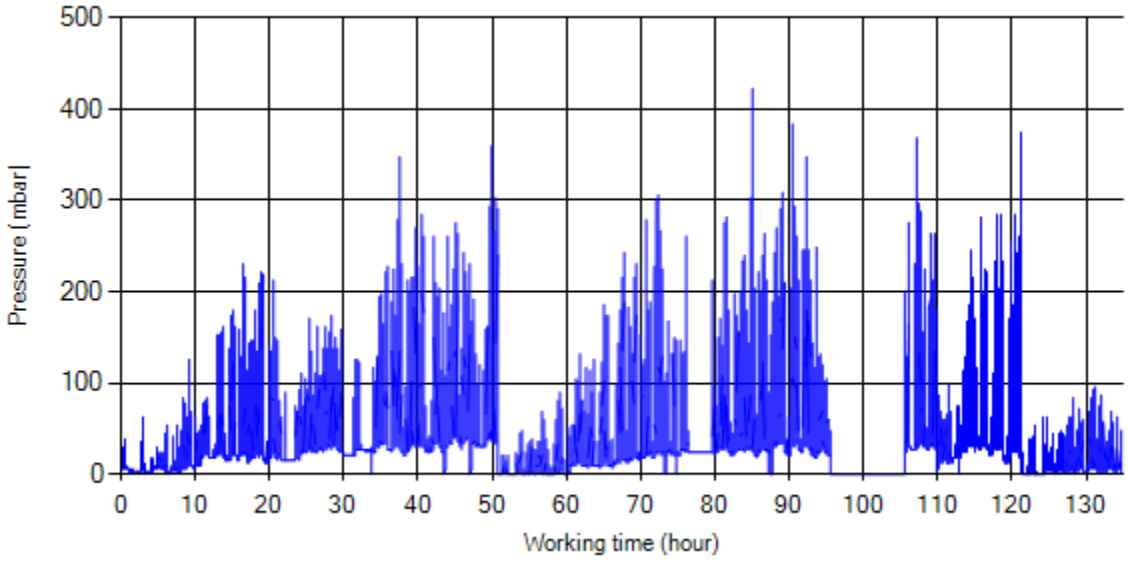


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

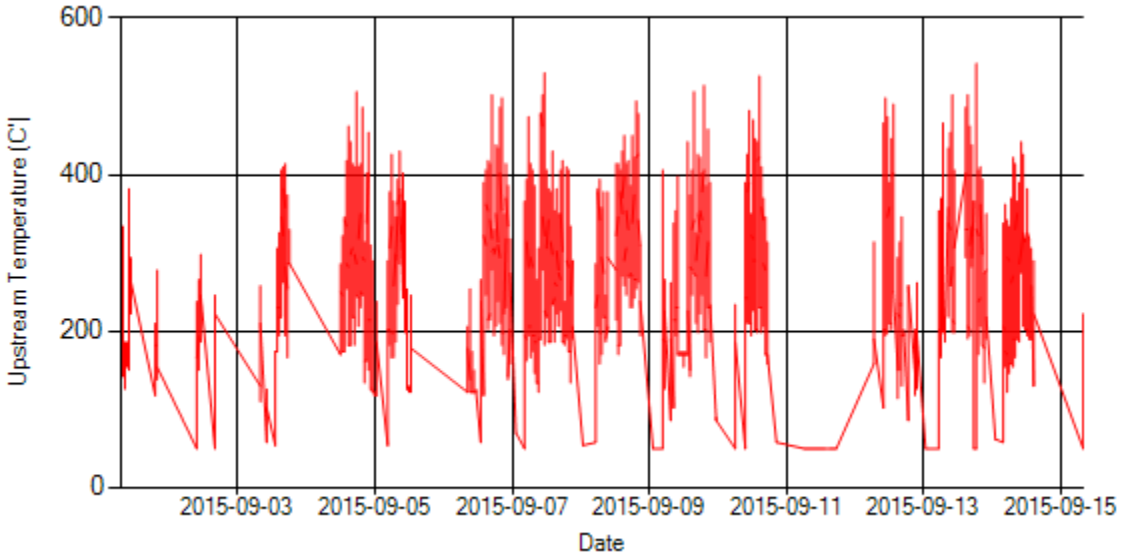


Figure 6- Temperature distribution over the period

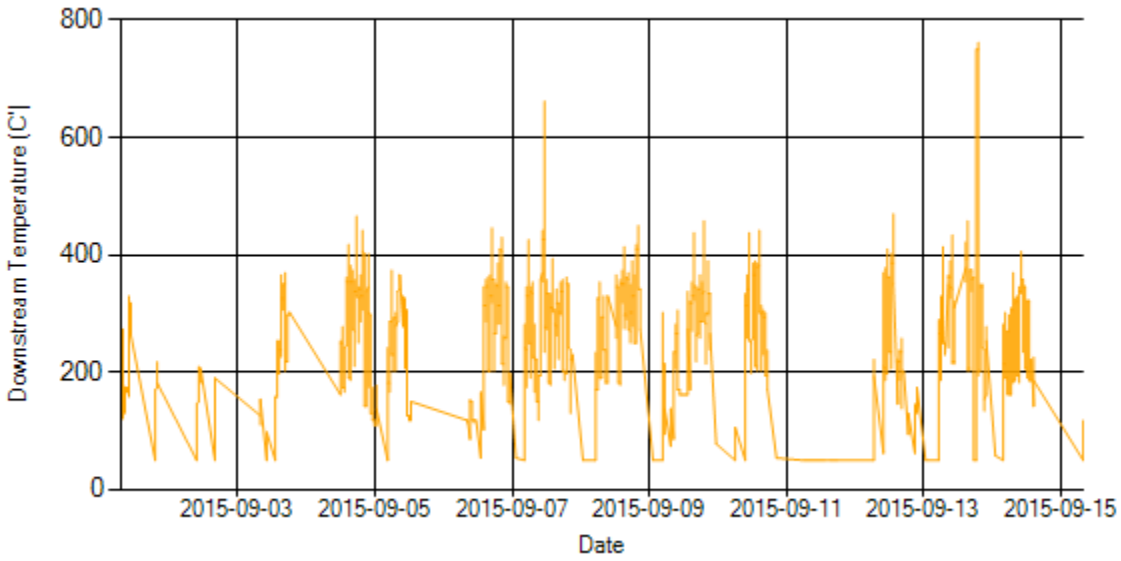


Figure 7- Temperature distribution over the period

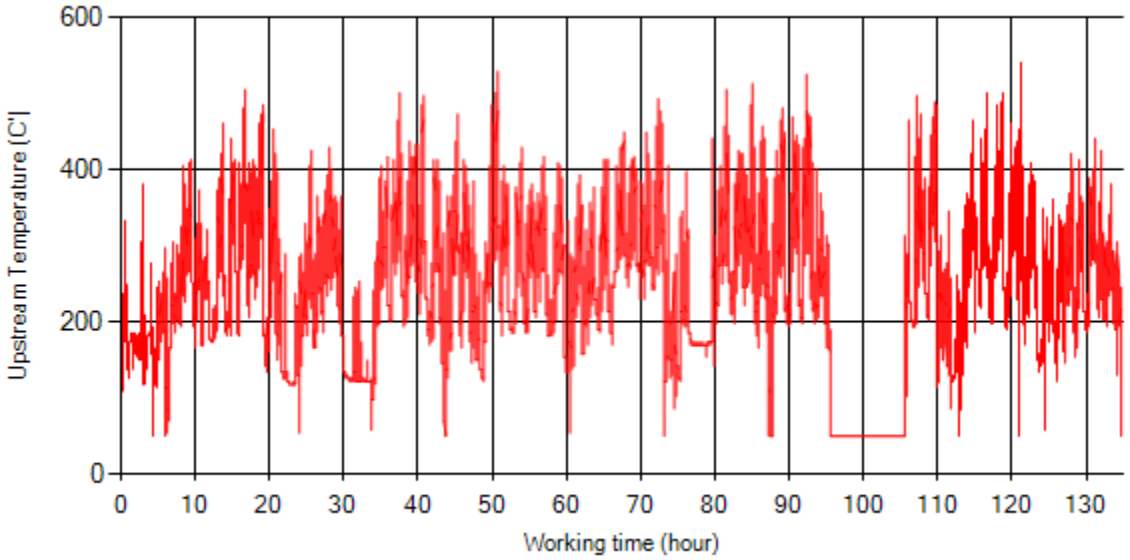


Figure 8- Temperature vs. working hours

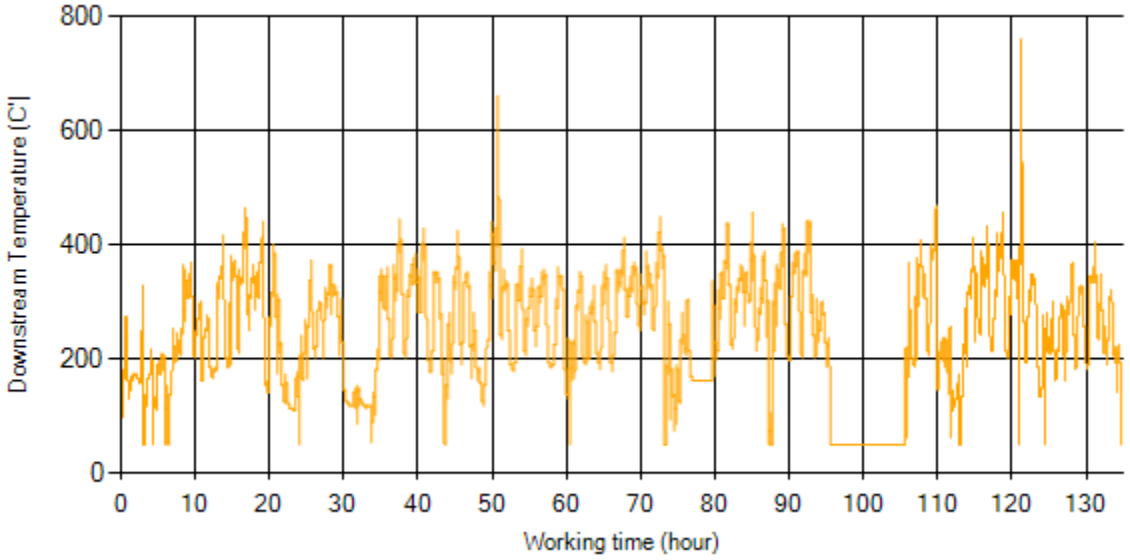


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

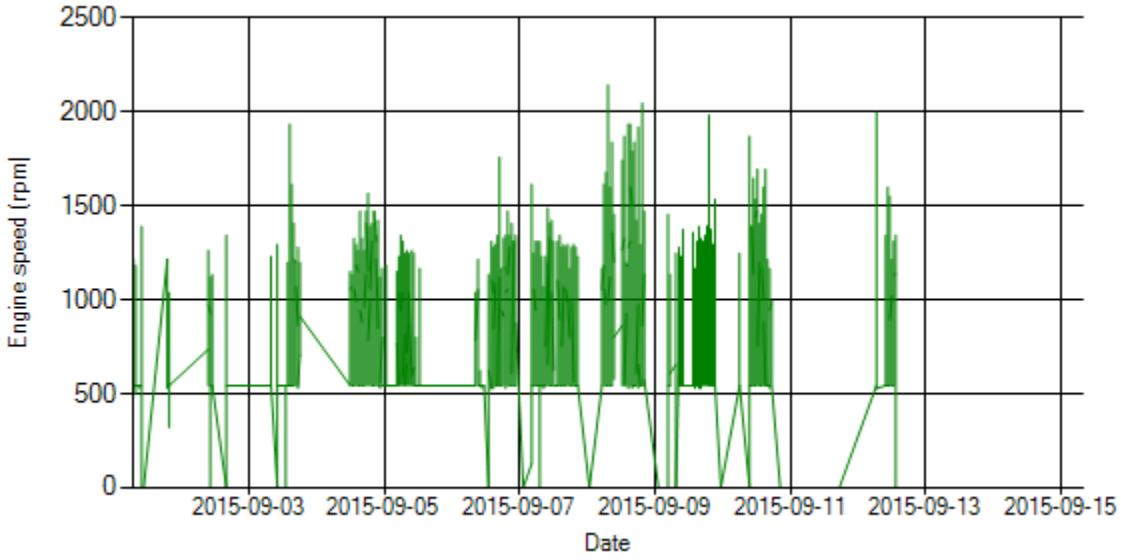


Figure 10- Engine speed distribution over the period

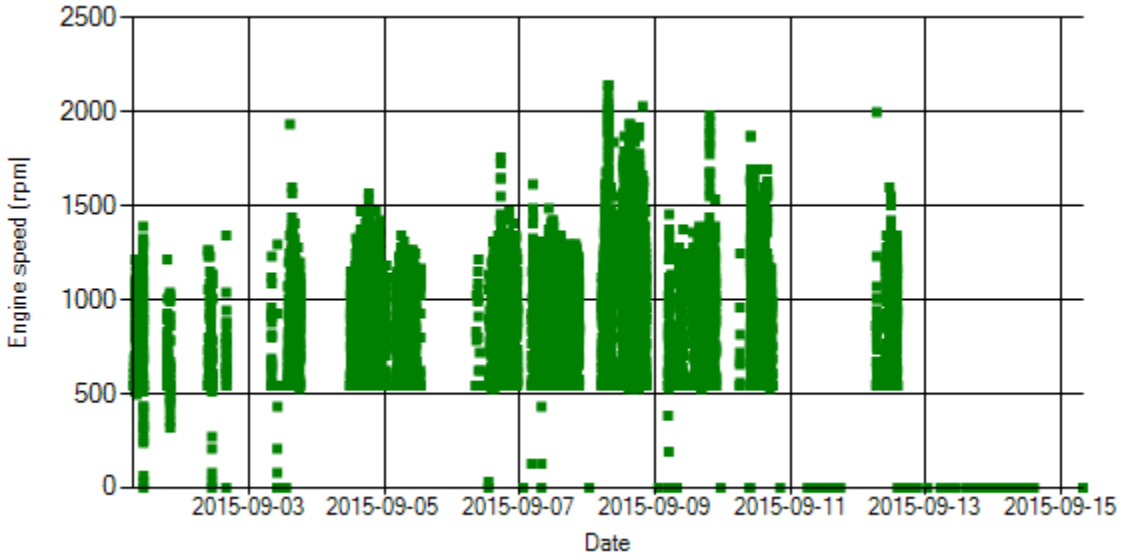


Figure 11- Engine speed diagram for calculating CPK's working days

Notice: RPM sensor got problem on Sep 12th .

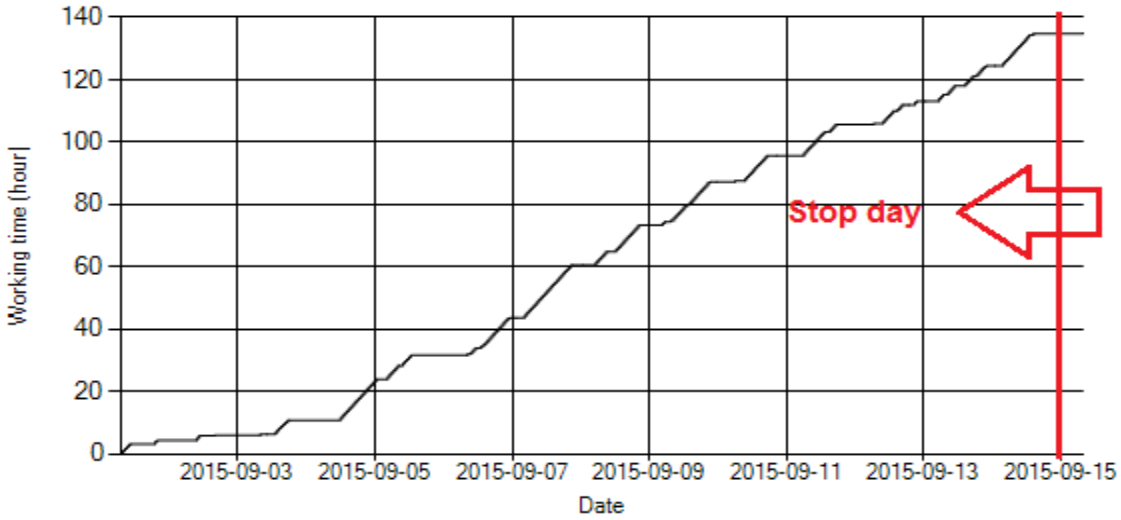


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

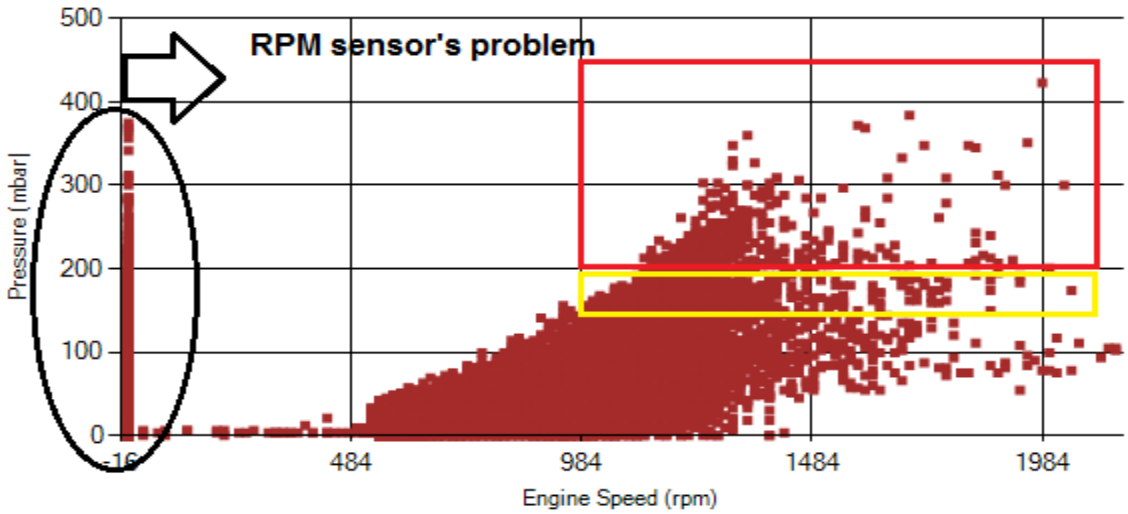


Figure 13- Pressure against engine speed

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

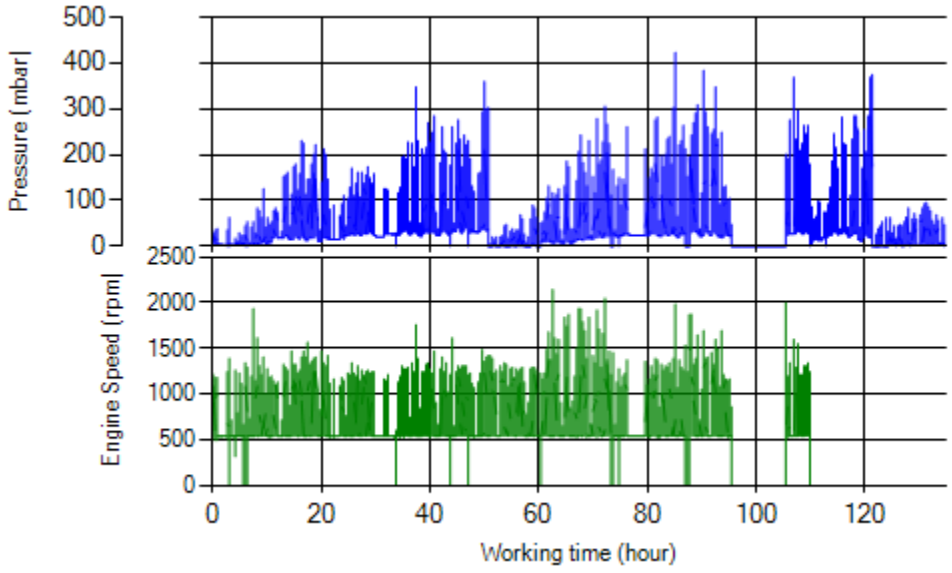


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

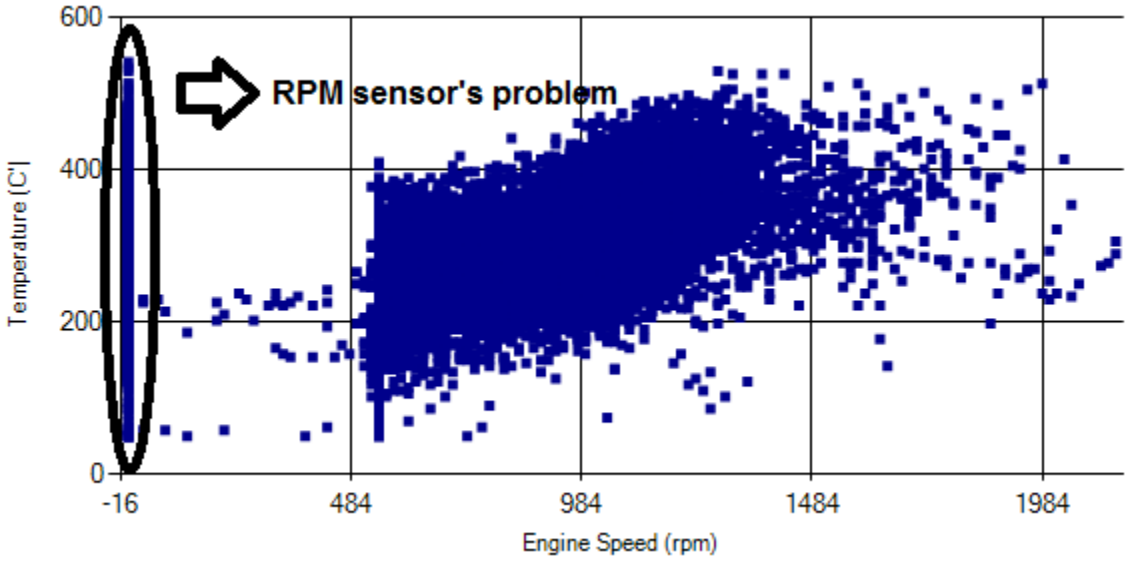


Figure 15- Temperature against engine speed

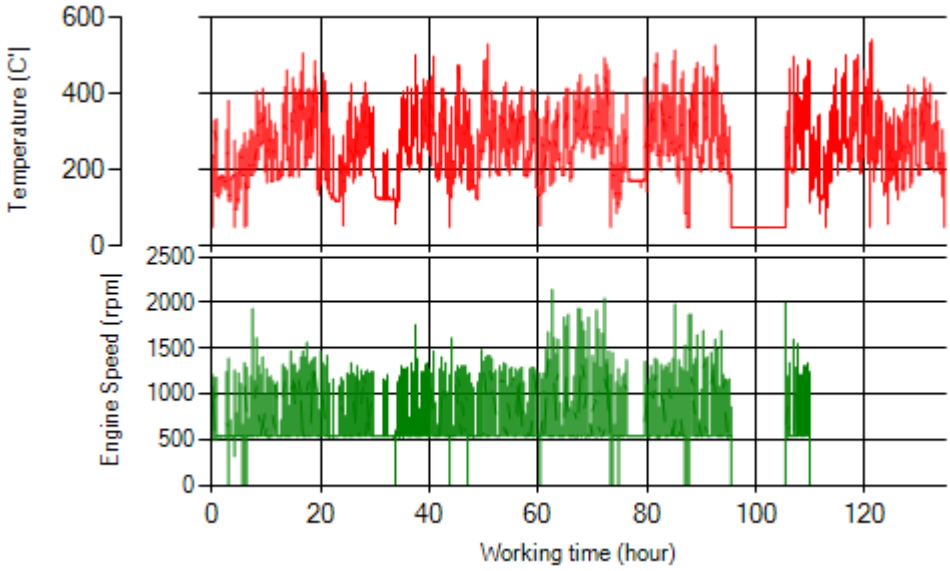


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.93% of total working time pressure is above 200 mbar and 2.98% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 3% of total working time temperature is above 400°C. Considering temperature distribution of this line's buses (T400<<1%), it is clear this distribution was because of high back pressure.

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

Overall Information

Table1- Overall Information

Vehicle plate number	33572 (28958)
CPK data logger number	LN: 001521, DN: 1995, Sim Number +989218469643
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF producer company	HJS_03 (active system with FBC – electrical heater)
Installation date	19/Feb/2015
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value - DPF upstream	1.80 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	30827 km
Bus mileage over the period	1419 km
Working days over the period	8 days
Stop days	7 days
Data logger working days	8 days
Working hours over the period	126 hours 45 minutes
Average working hours per day (including stop days)	8 hours 26 minutes
Bus average speed	11.2 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	946 lit
Fuel consumption per hour	7.46 lit/hr
Average fuel consumption	0.67 lit/km
Total Bus additive consumption over the period	0.390 lit
Average additive consumption	276 cc/km
Additive consumption to fuel ration	415 cc per 1000 lit (batch dosing with tank level)

Notice: RPM sensor got problem during this period. So some related parameters and information are unreliable (e.g. idle speed time).

Temperature, Pressure and Engine Speed Overview

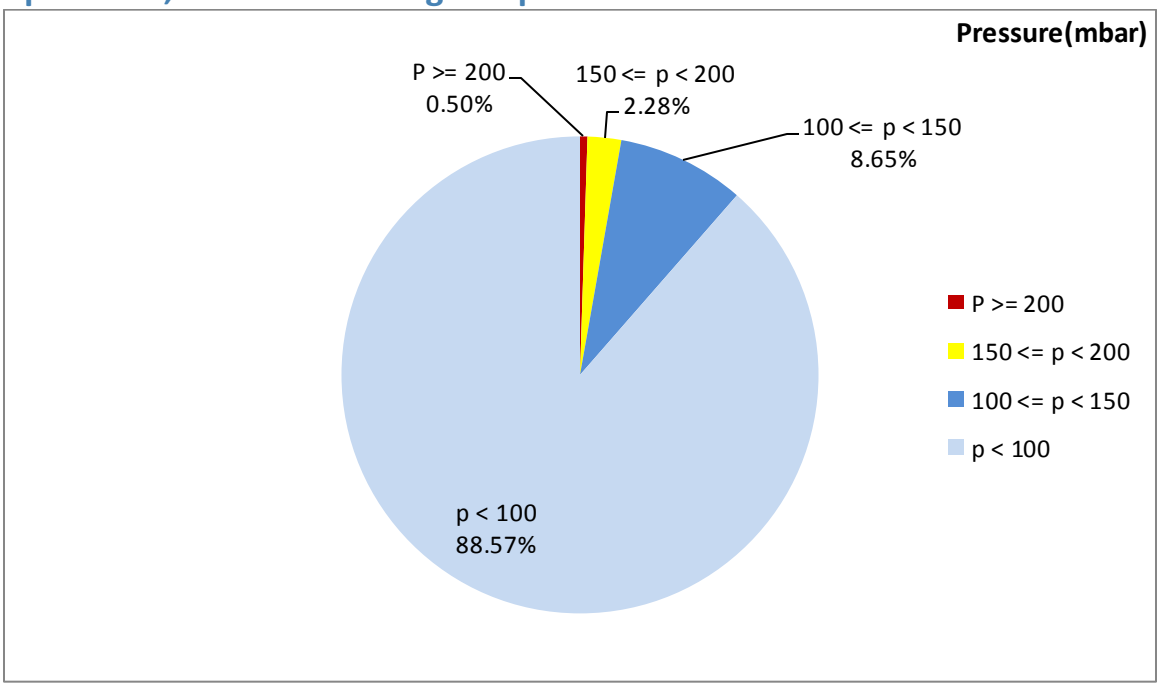


Figure 1- Pressure distribution over the working hours

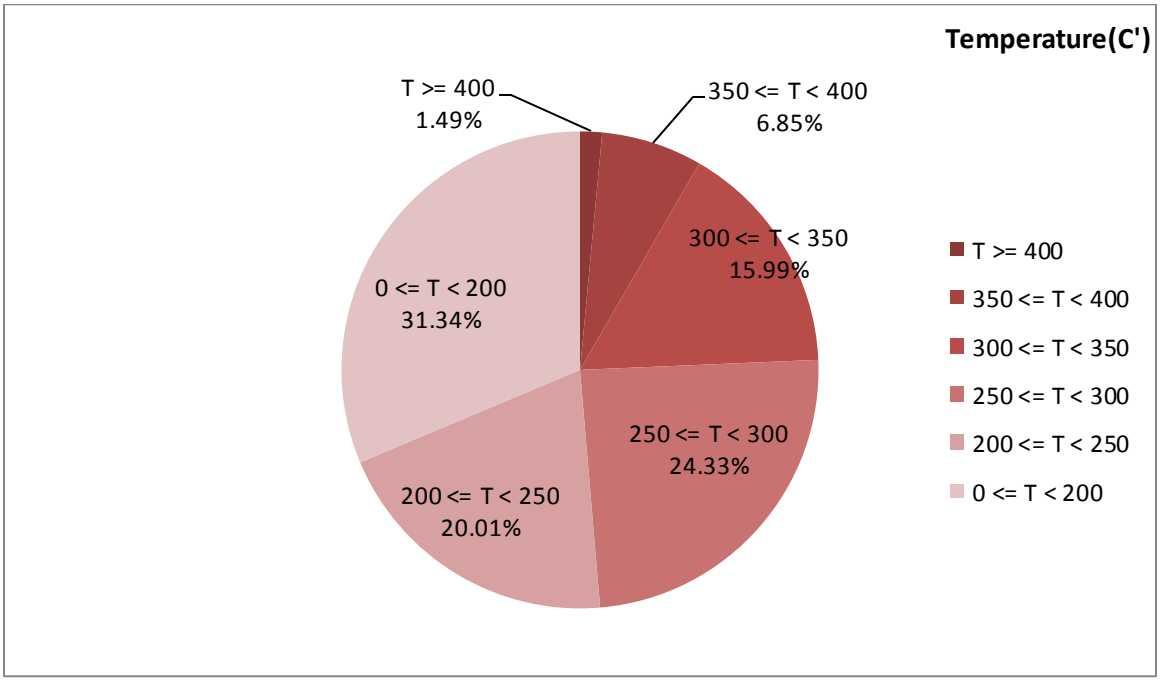


Figure 2-Temperature distribution over the working hours

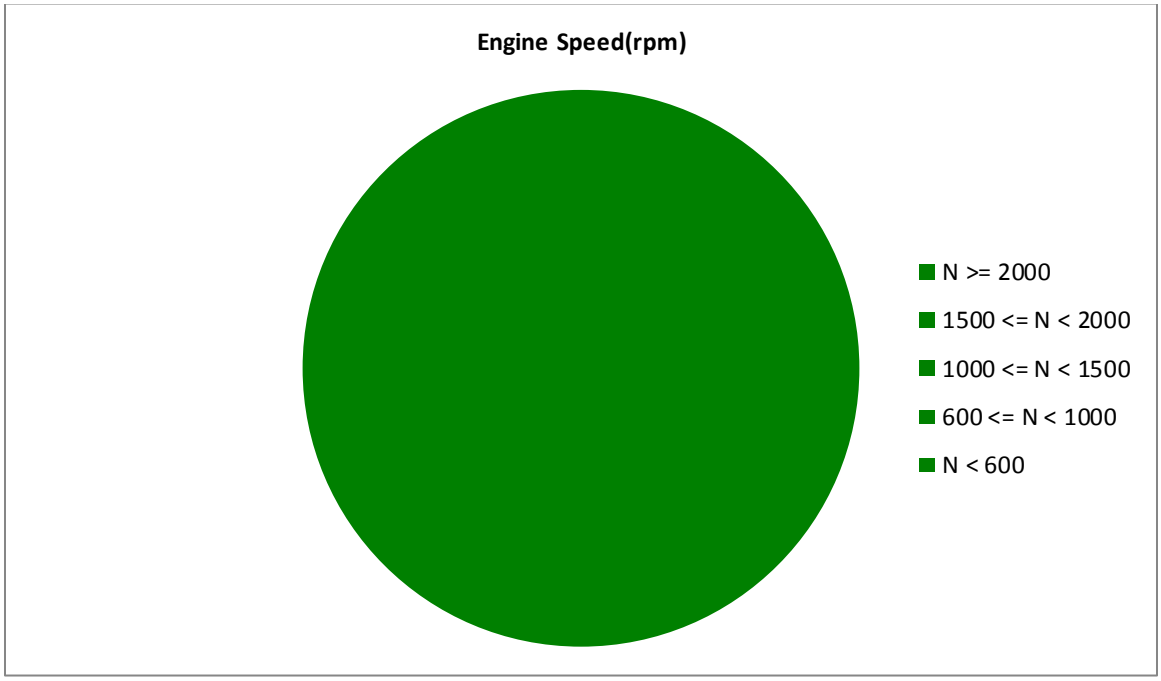


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
243.32	43.35	-

Table 5- Mean values without idling

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

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
502-50	357-0	-

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

Detailed Pressure Analysis

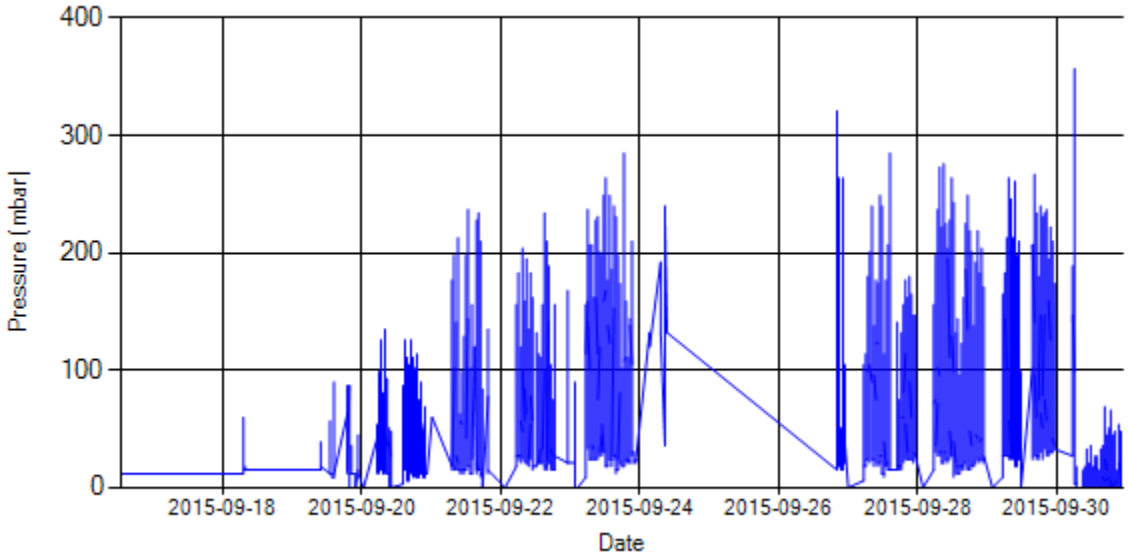


Figure 4- Pressure distribution over the period

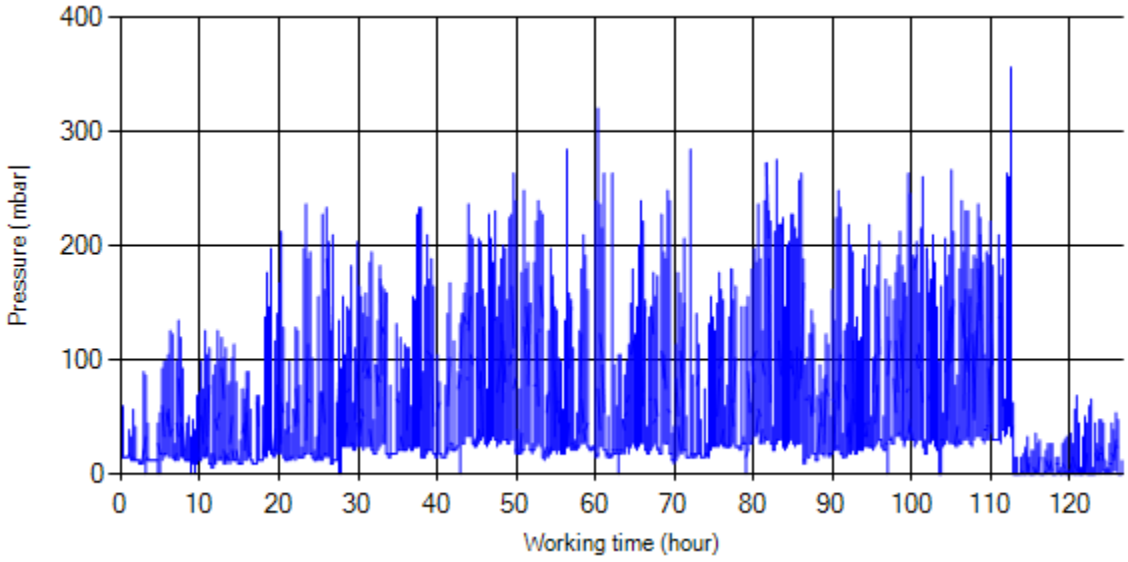


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

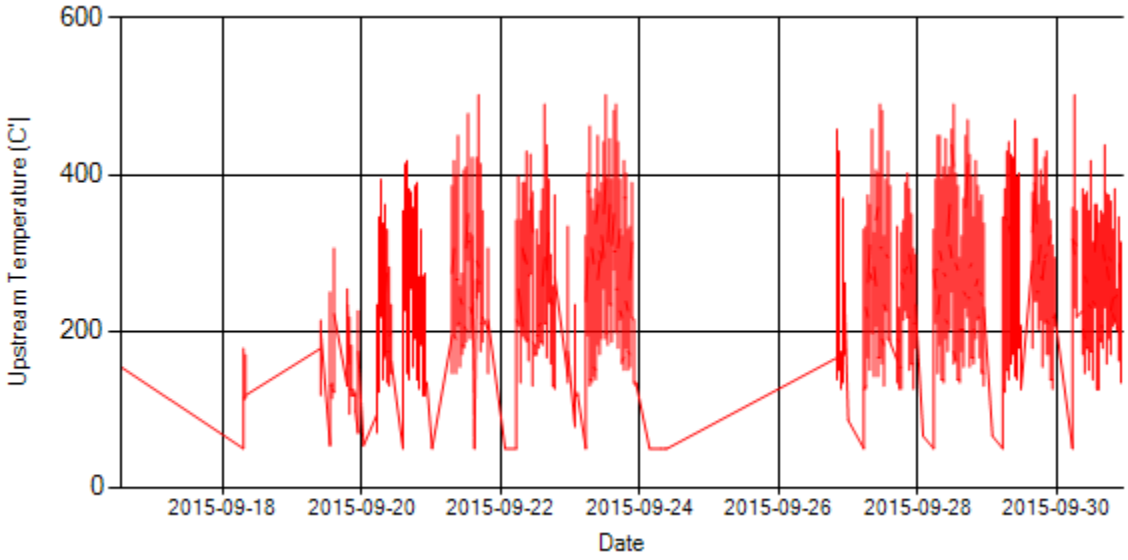


Figure 6- Temperature distribution over the period

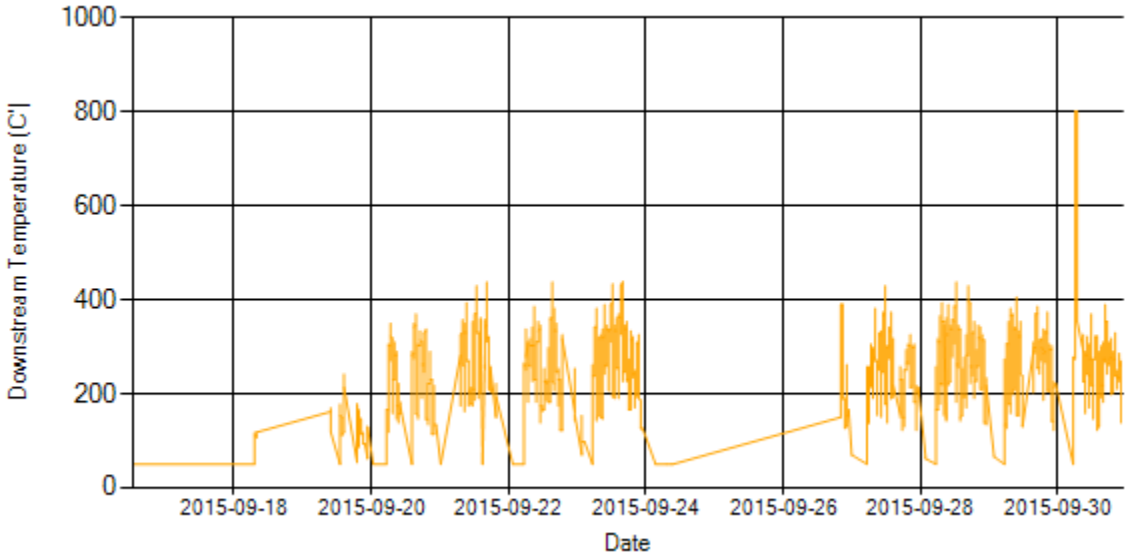


Figure 7- Temperature distribution over the period

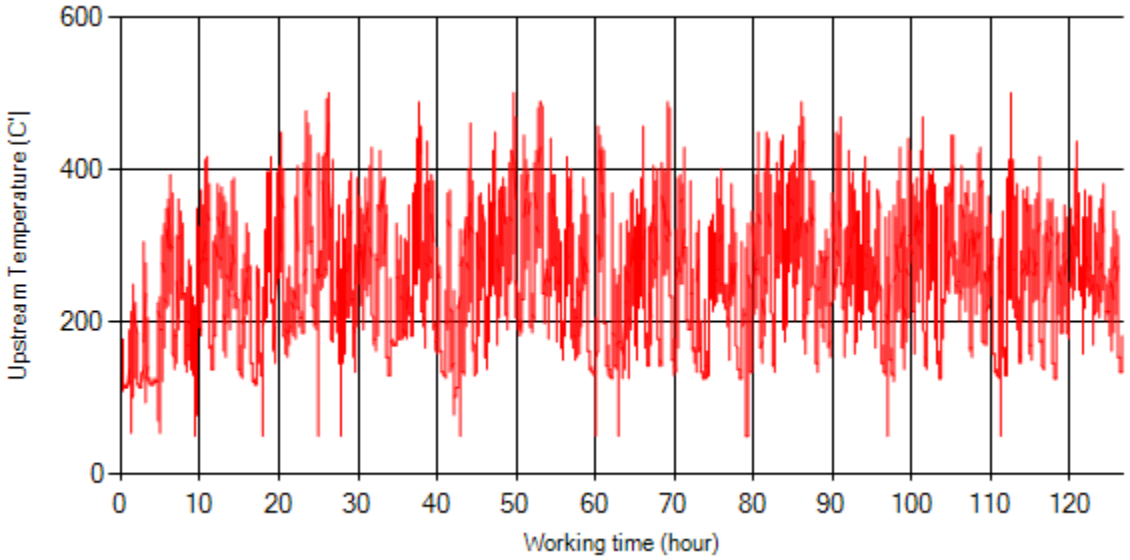


Figure 8- Temperature vs. working hours

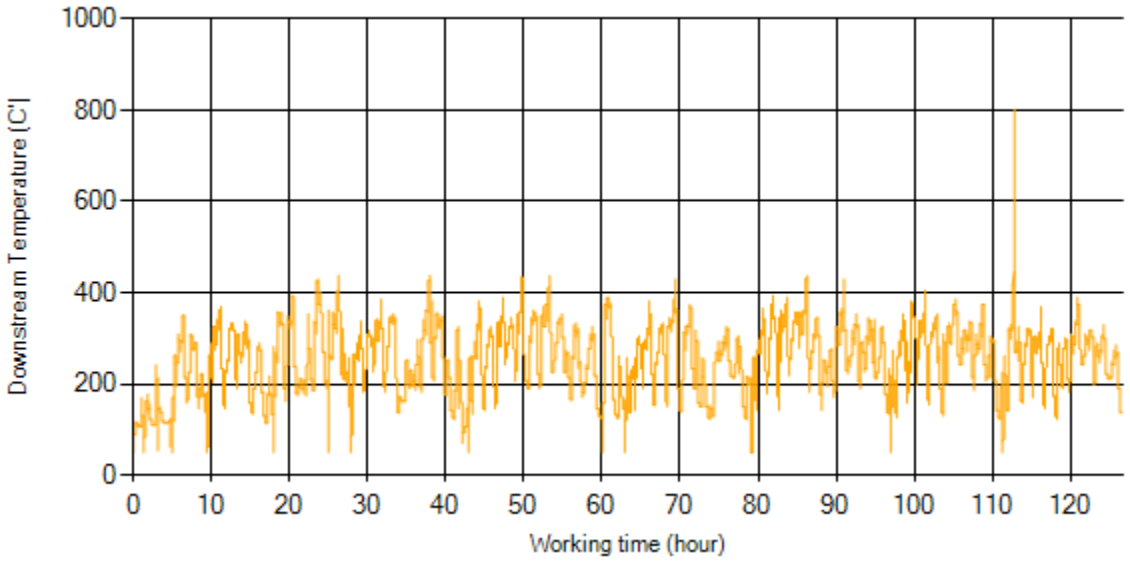


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

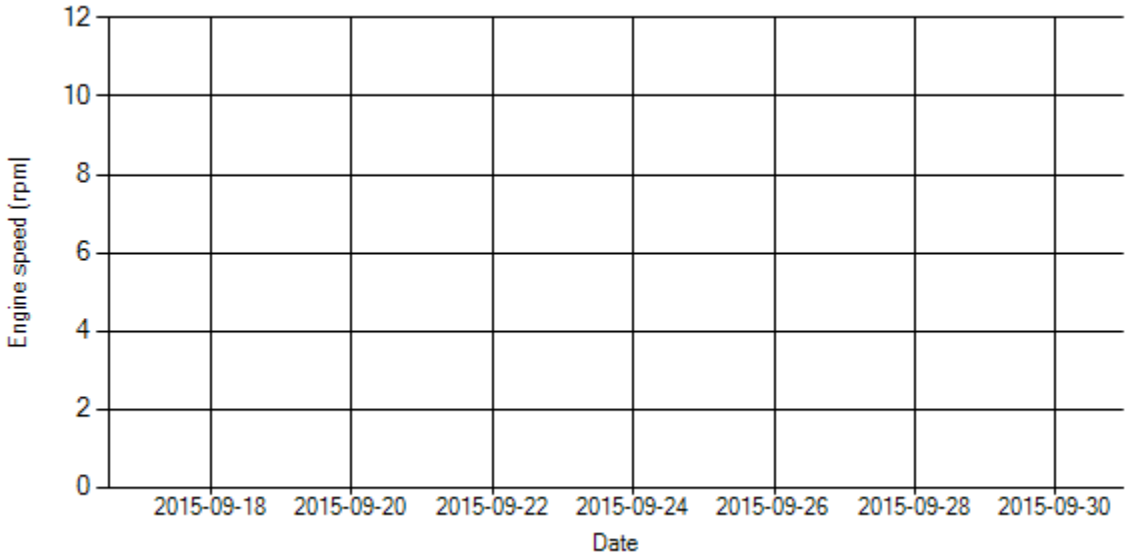


Figure 10- Engine speed distribution over the period

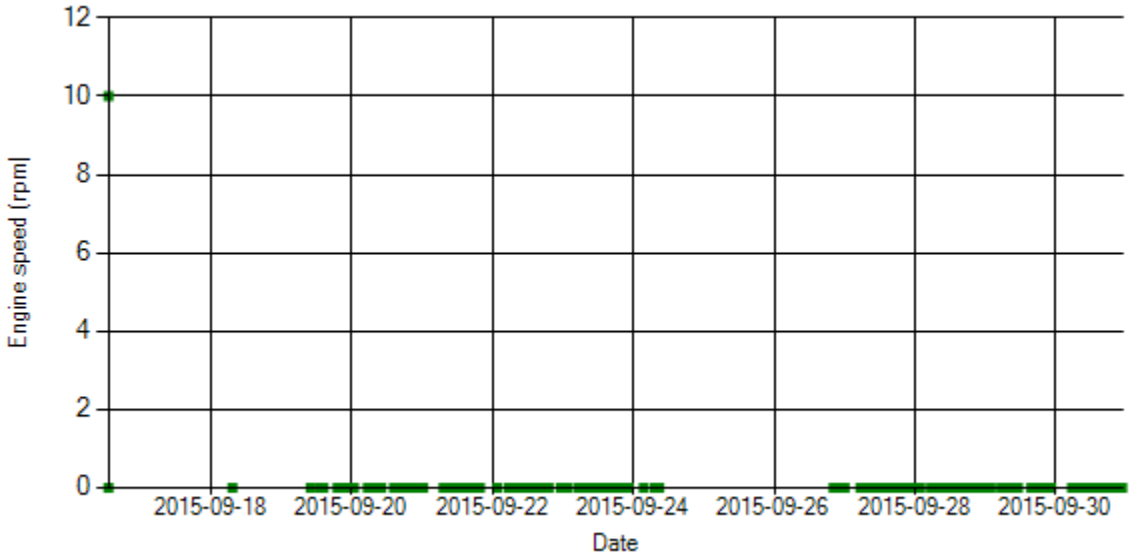


Figure 11- Engine speed diagram for calculating CPK's working days

Notice: RPM sensor had problem during this period.

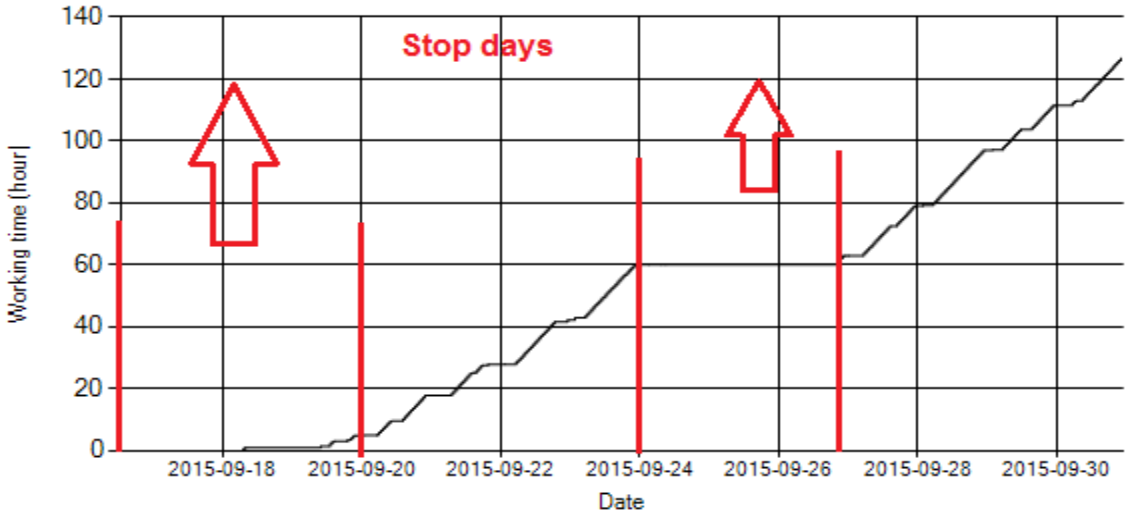


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

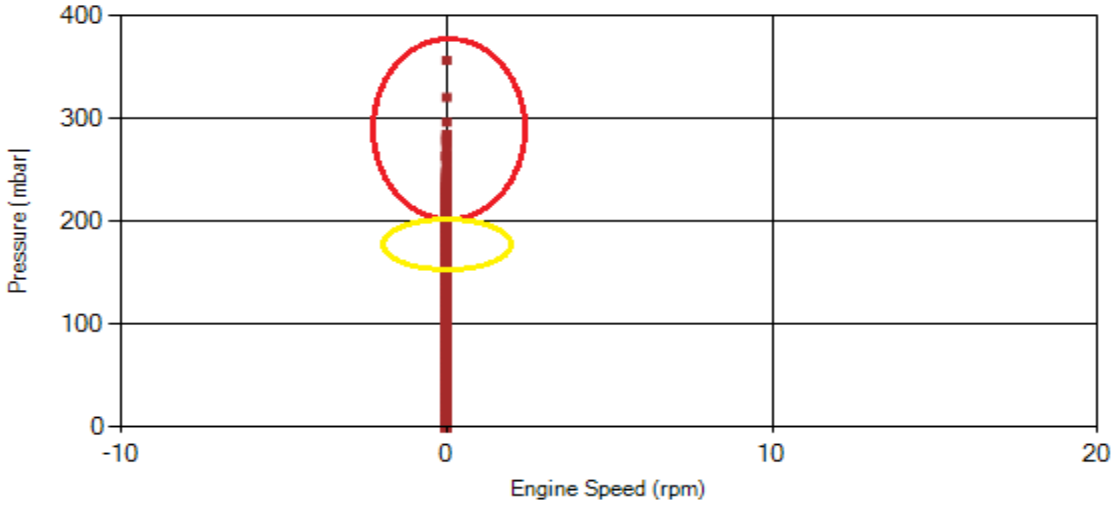


Figure 13- Pressure against engine speed

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

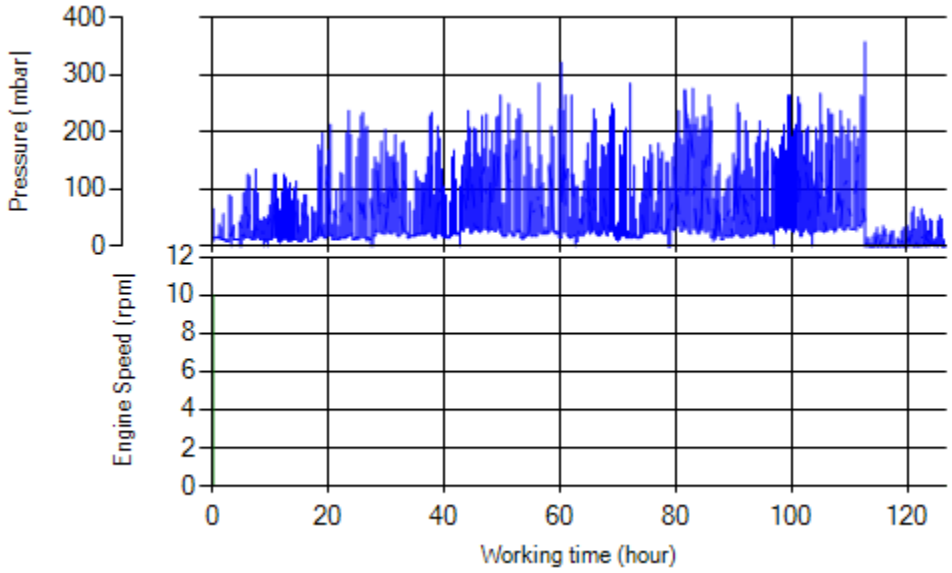


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

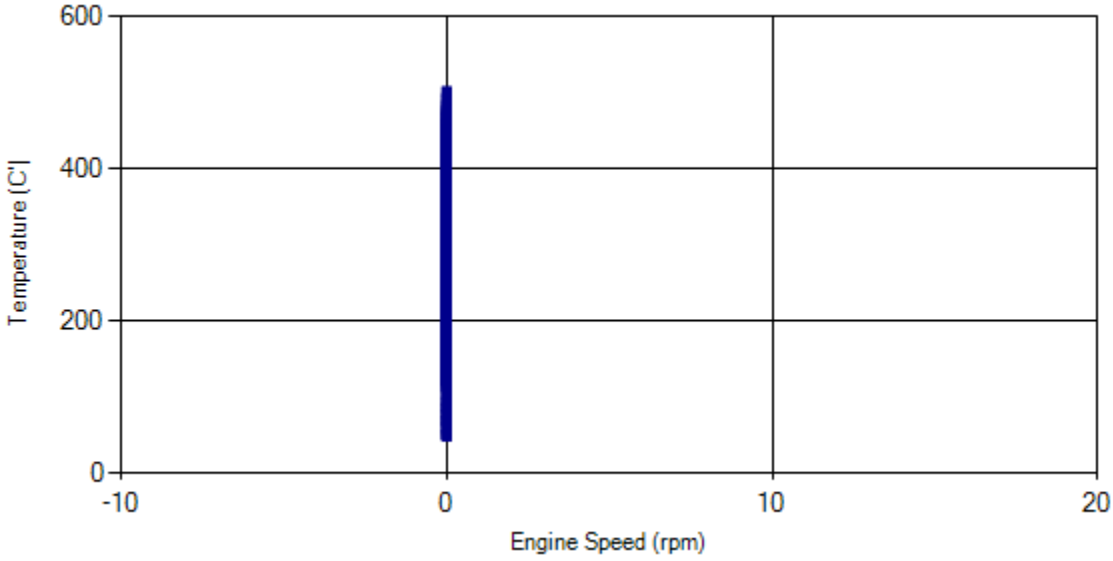


Figure 15- Temperature against engine speed

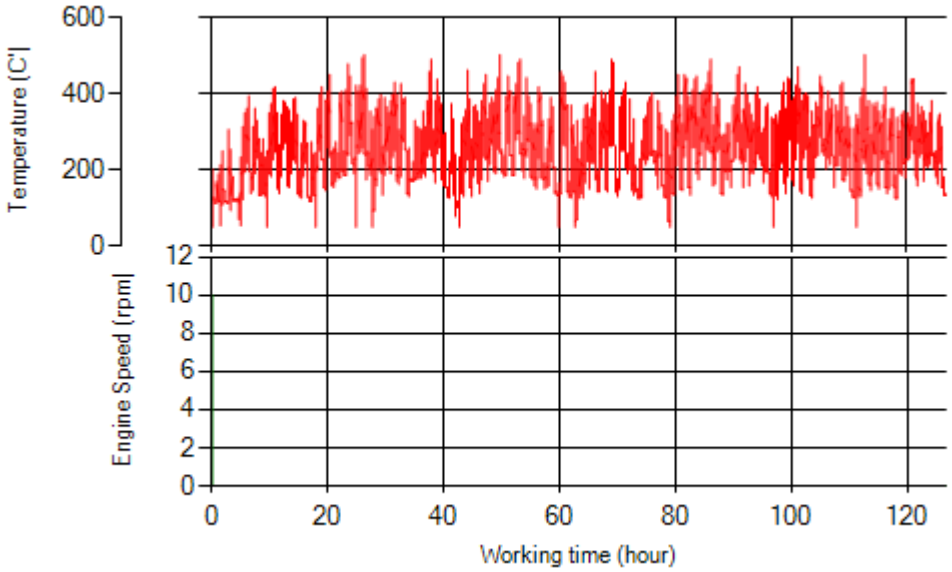


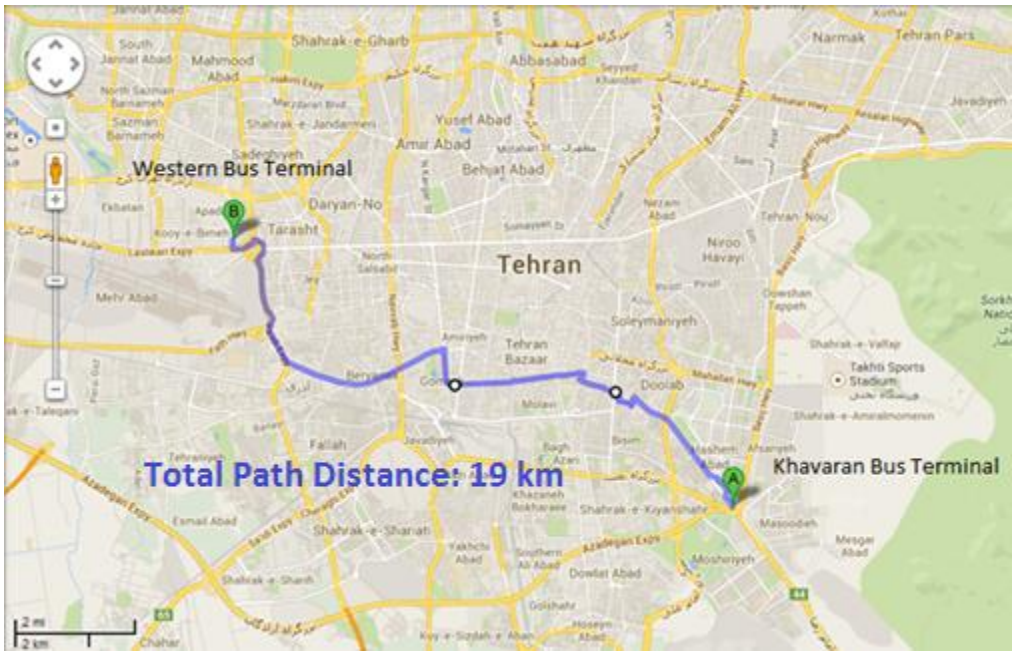
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0.50% of total working time pressure is above 200 mbar and 2.78% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 1.5% of total working time temperature is above 400°C. Considering temperature distribution of this line's buses (T400<<1%), it is clear this distribution was because of high back pressure.

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

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



Overall Information

Table1- Overall Information

Vehicle plate number	33637 (34119)
CPK data logger number	LN: 001492, DN: 1933, Sim +989210000000
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF company producer	Dinex_02 (Passive system with FBC)
Installation date	02/Jun/2015
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF had been removed after two weeks working on Jun 17th. After receiving cleaning machine DPF was cleaned on Aug 10th and was installed on Aug 22nd but worked only for ten days. The last cleaning was done on Sep 24th but cleaning issue was unavoidable after only three days working. Finally DPF was replaced by muffler on Sep 8th and system have been working from that date without DPF.
Dosing status	Additive dosing was increased 60% of its initial value for tests two and three.

Table 3- Fuel and Additive Consumption Information

Bus mileage over the period	1644 km
Working days over the period	12 days
Stop days	3 days
Data logger working days	12 days
Working hours over the period	161 hours 28 minutes
Average working hours per day (including stop days)	10 hours 46 minutes
Bus average speed	10.18 km/hr
idle speed time to all working time ration	60.15 %
Total Bus fuel consumption over the period	1030 lit
Fuel consumption per hour	6.38 lit/hr
Average fuel consumption	0.63 lit/km
Total Bus additive consumption over the period	- lit
Average additive consumption	- cc/km
Additive consumption to fuel ration	- cc/1000lit

Notice: DPF had been installed on system only for four days. So additive consumption measurement was unreliable.

Temperature, Pressure and Engine Speed Overview

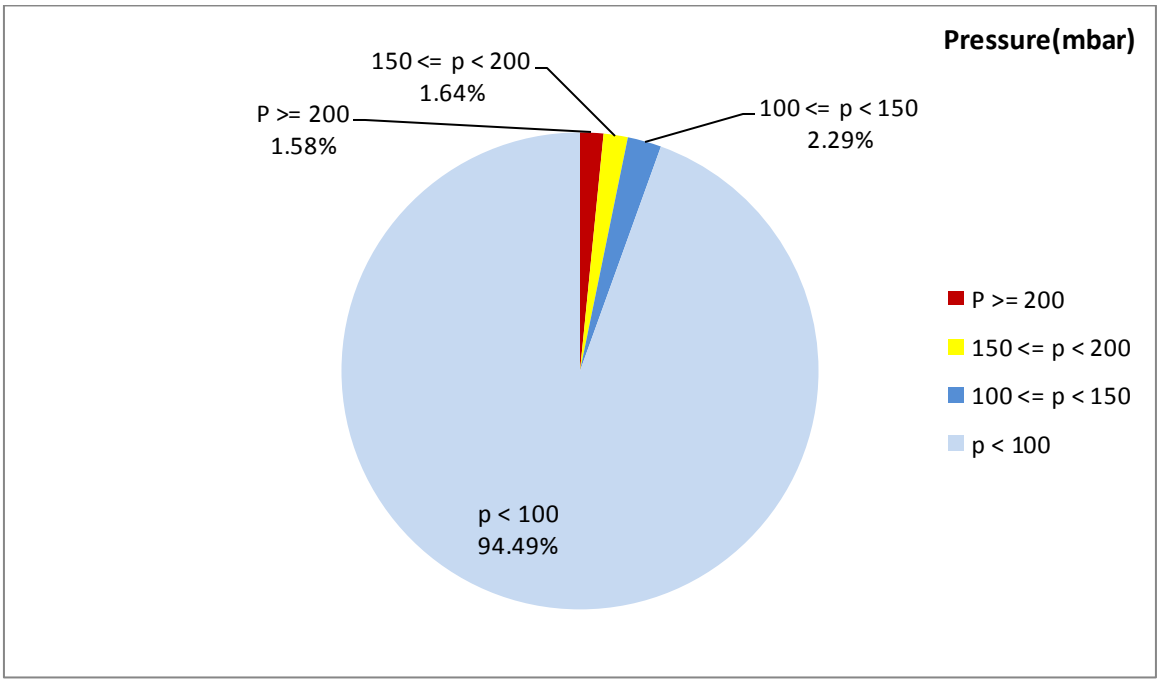


Figure 1- Pressure distribution over the working hours

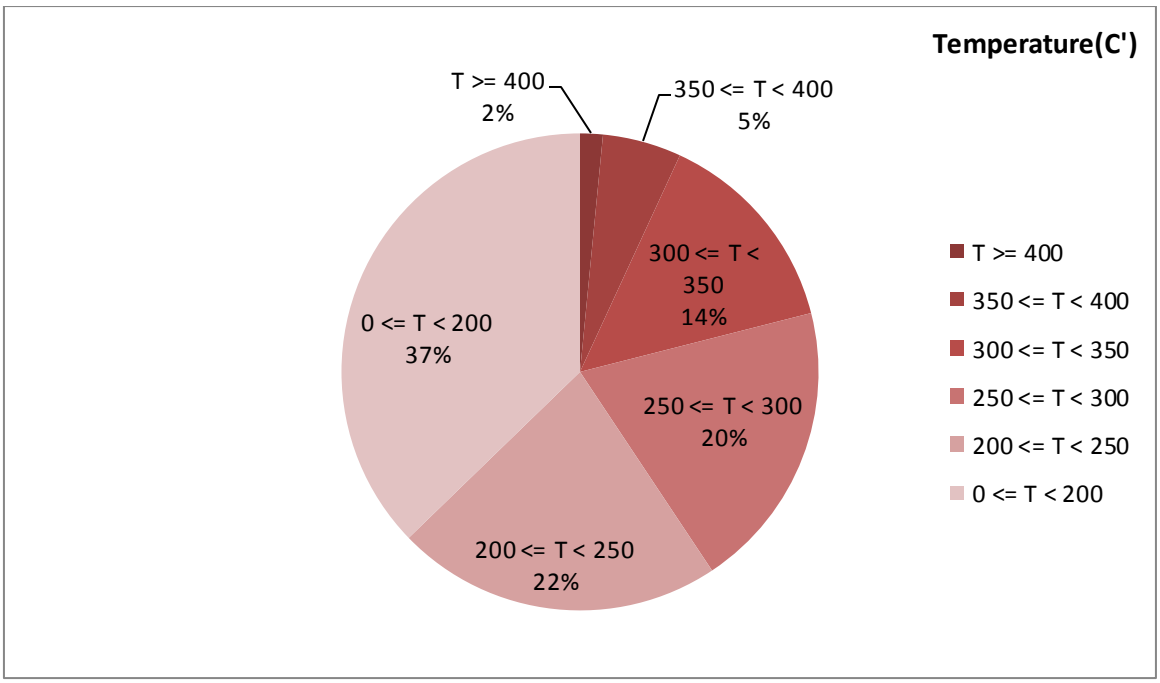


Figure 2-Temperature distribution over the working hours

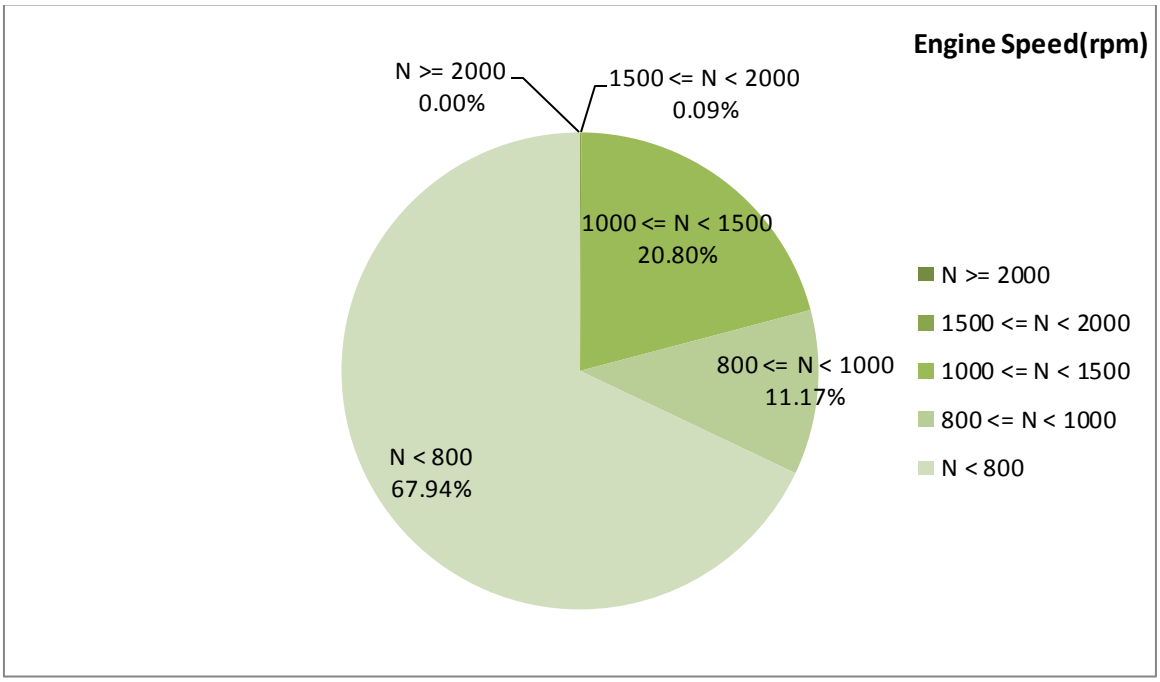


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
234.41	20.48	776

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
294.96	34	979

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
586-50	660-0	2096-256

Notice: It is worth-mentioning DPF had been installed on this bus only for four days during this period.

Detailed Pressure Analysis

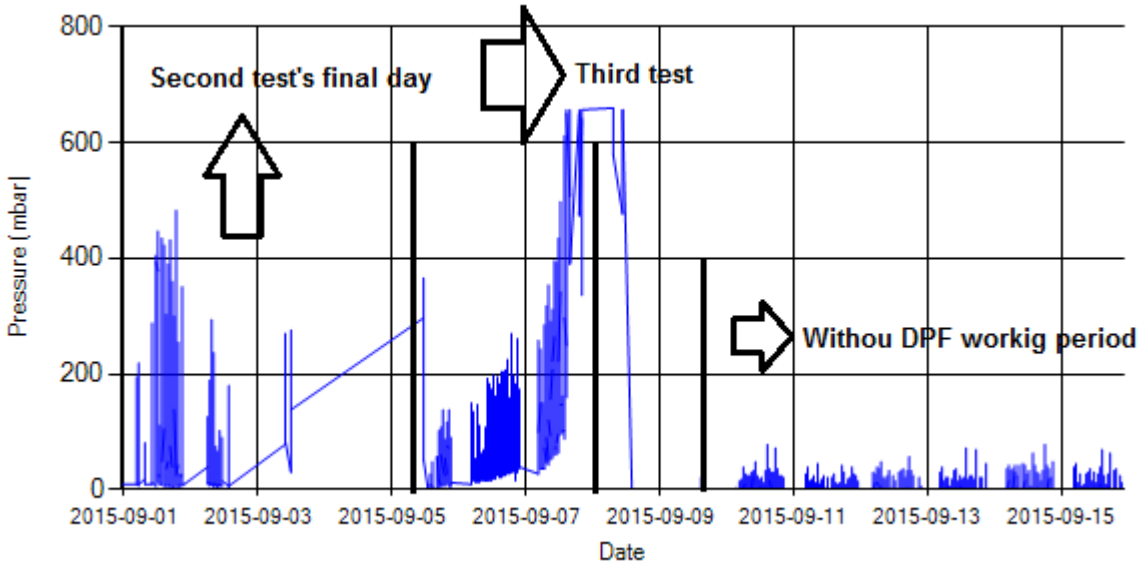


Figure 4- Pressure distribution over the period

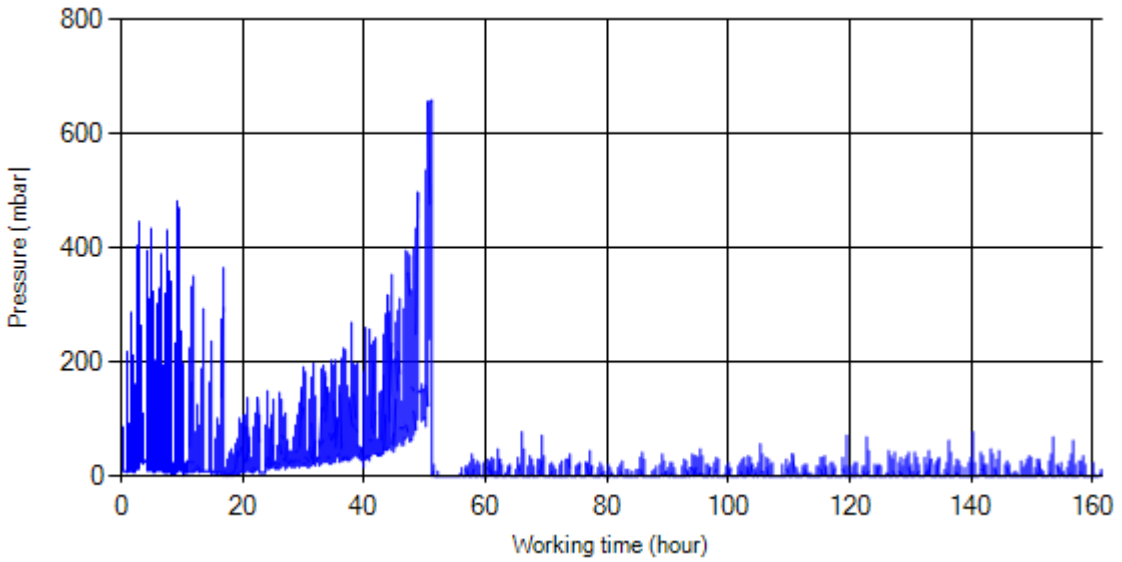


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

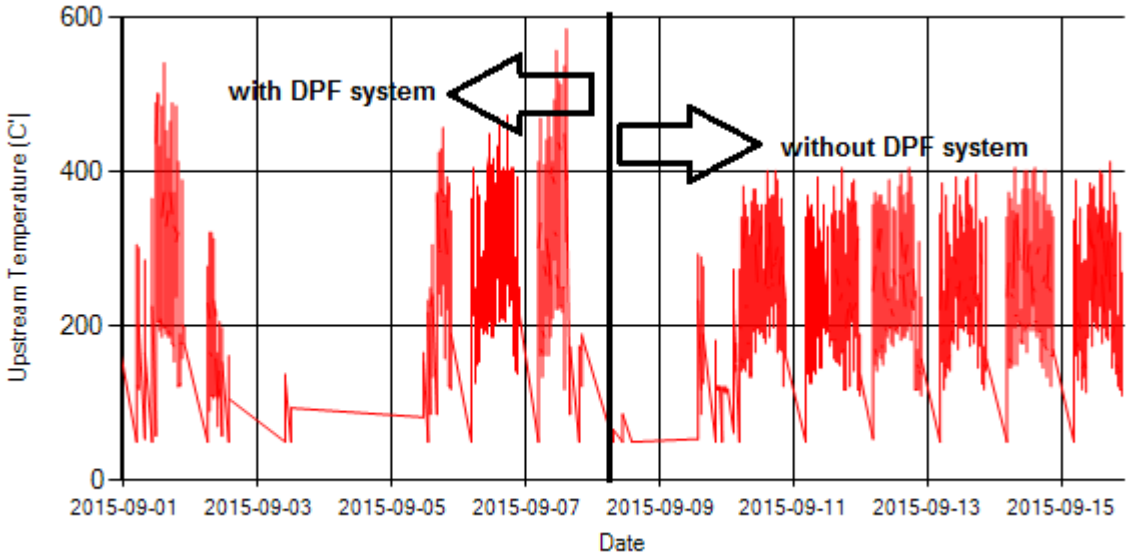


Figure 6- Temperature distribution over the period

Notice: Temperature rising due to back pressure was obvious by analyzing figure 6.

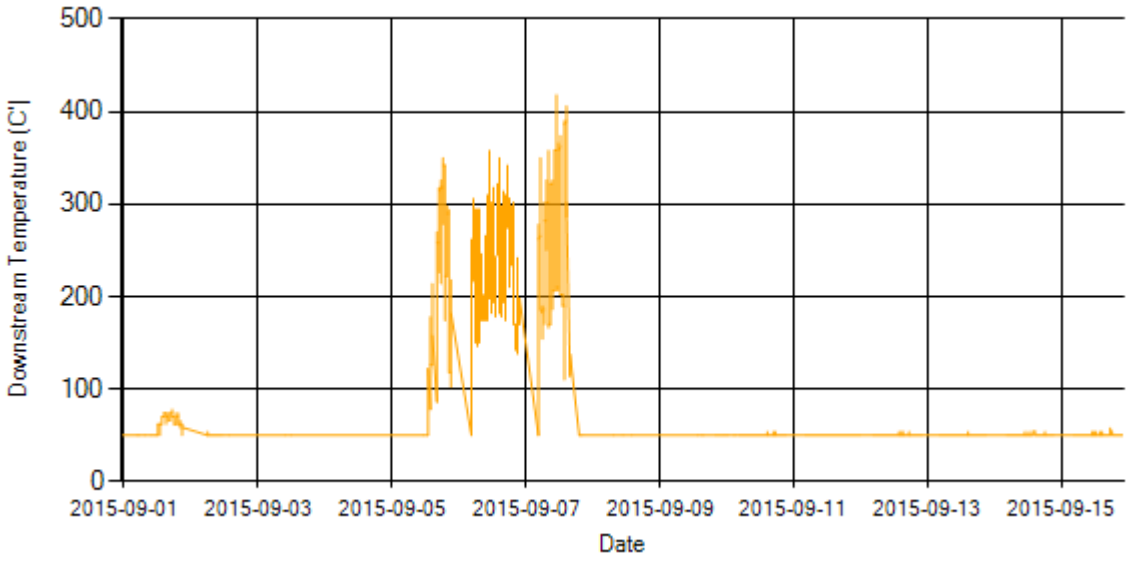


Figure 7- Temperature distribution over the period

Notice: Temp sensor 2 worked only for three days during this period.

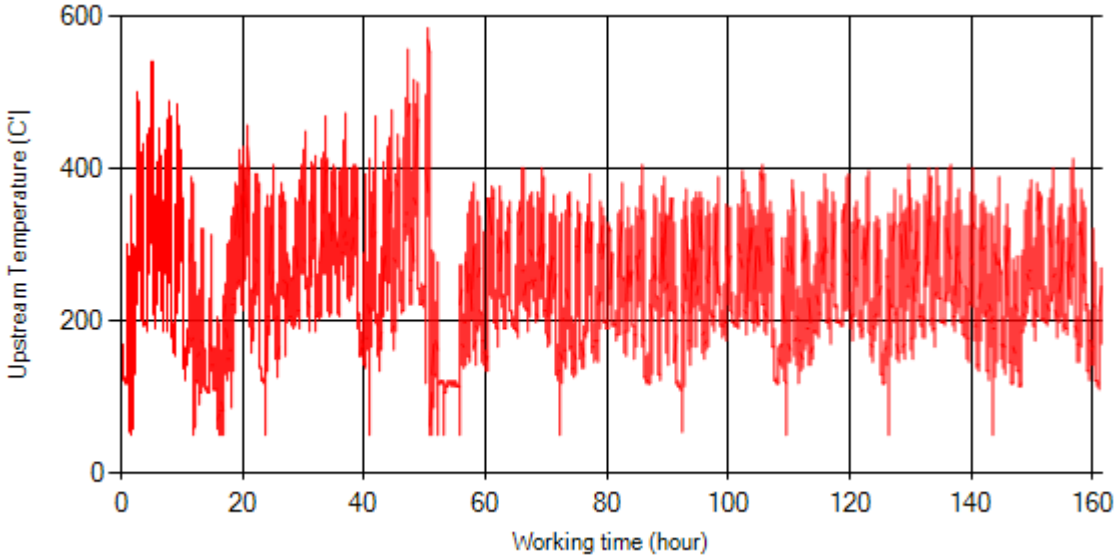


Figure 8- Temperature vs. working hours

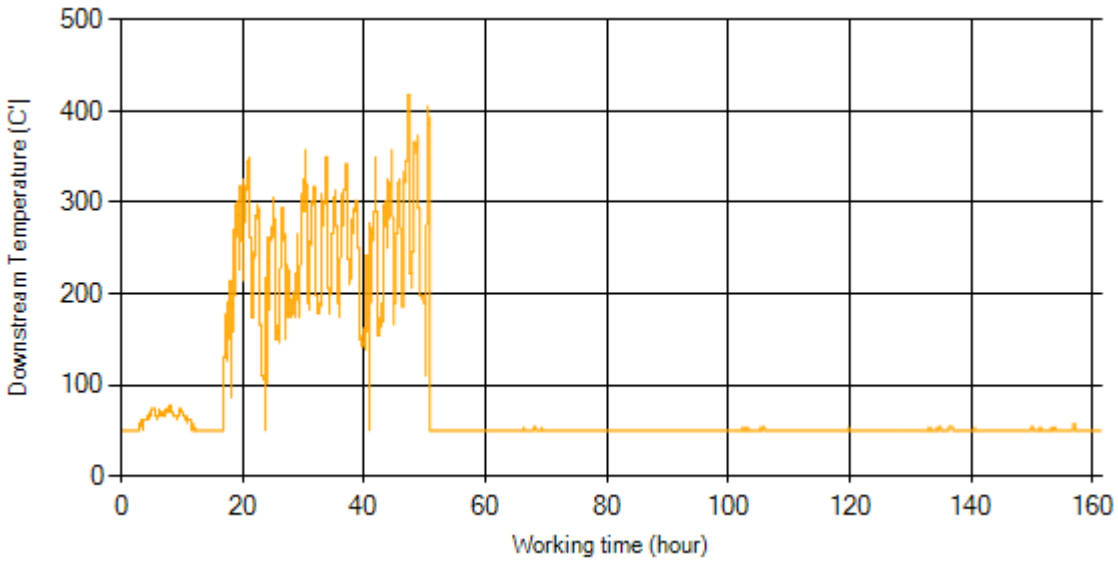


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

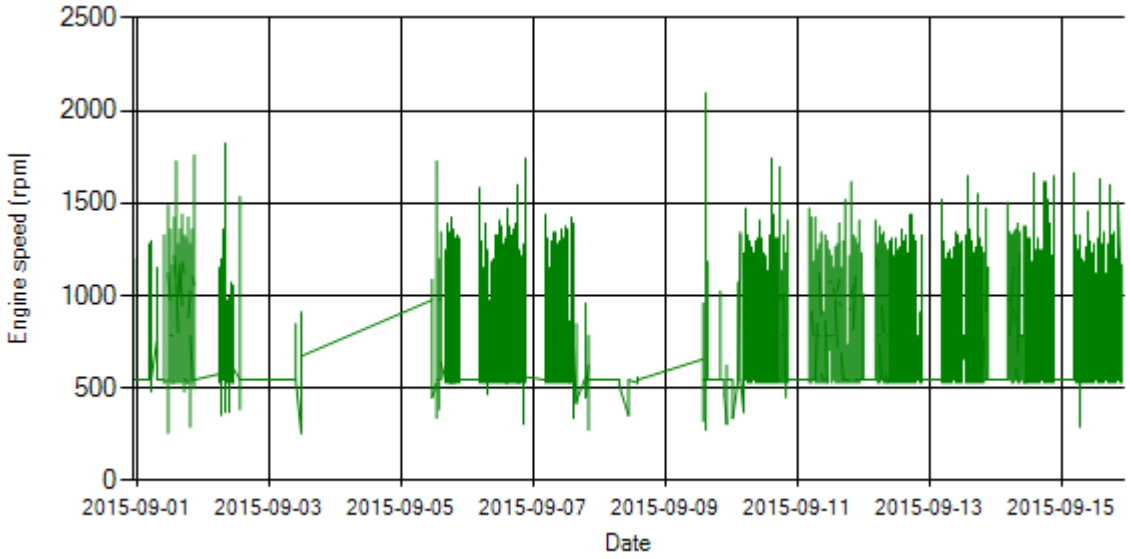


Figure 10- Engine speed distribution over the period

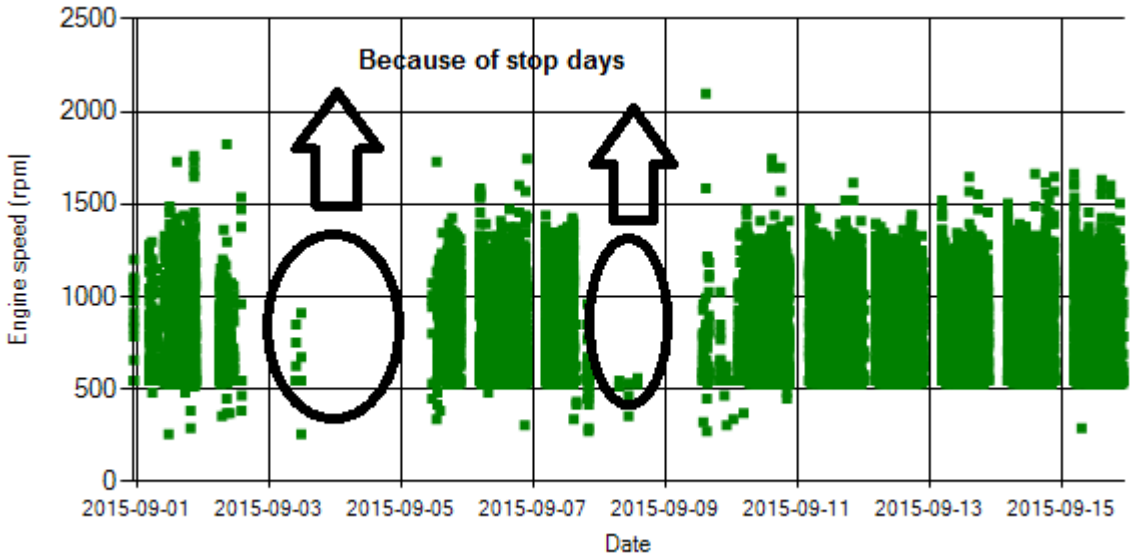


Figure 11- Engine speed diagram for calculating CPK's working days

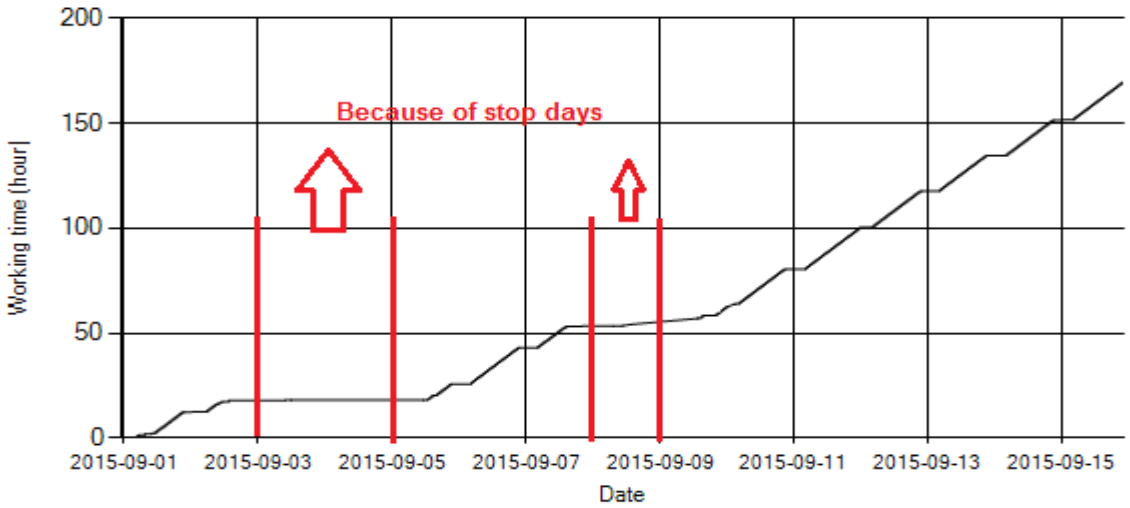


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

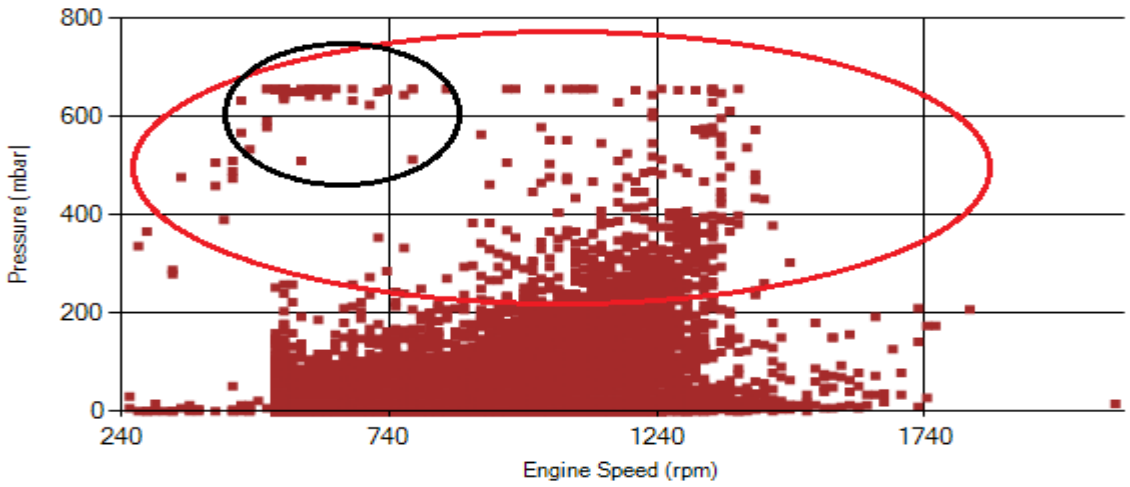


Figure 13- Pressure against engine speed

Notice: Red circle shows red alarm (pressure>200 mbar).
Notice: Black circle's data could be good reason for DPF blocking.

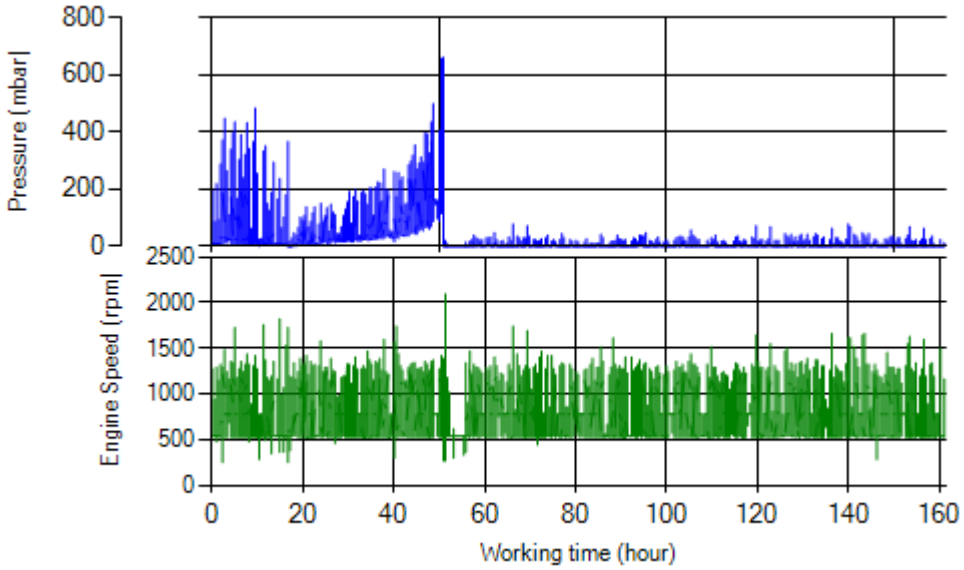


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

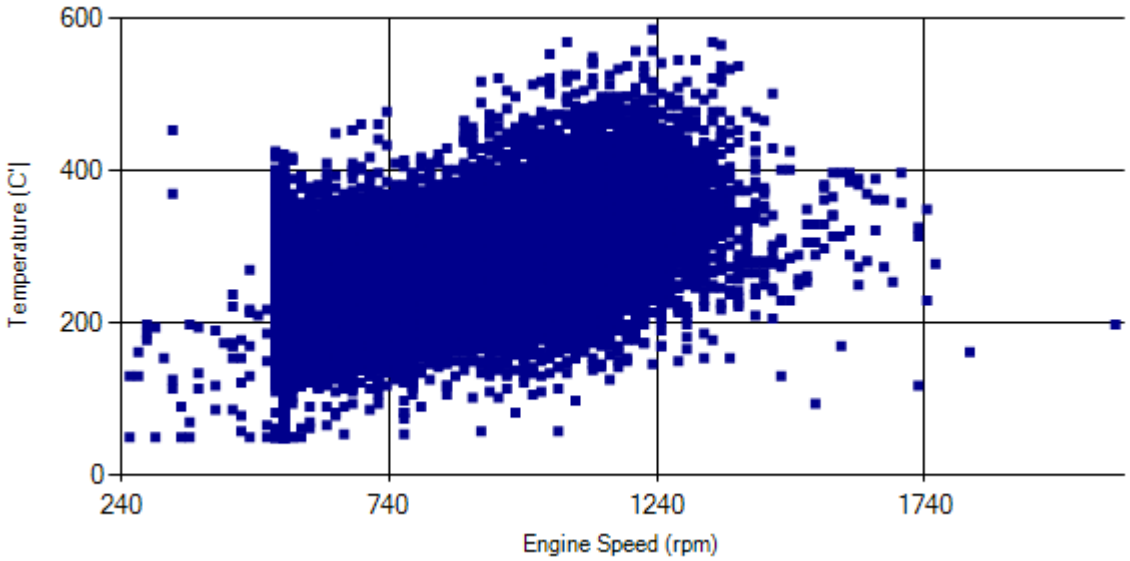


Figure 15- Temperature against engine speed

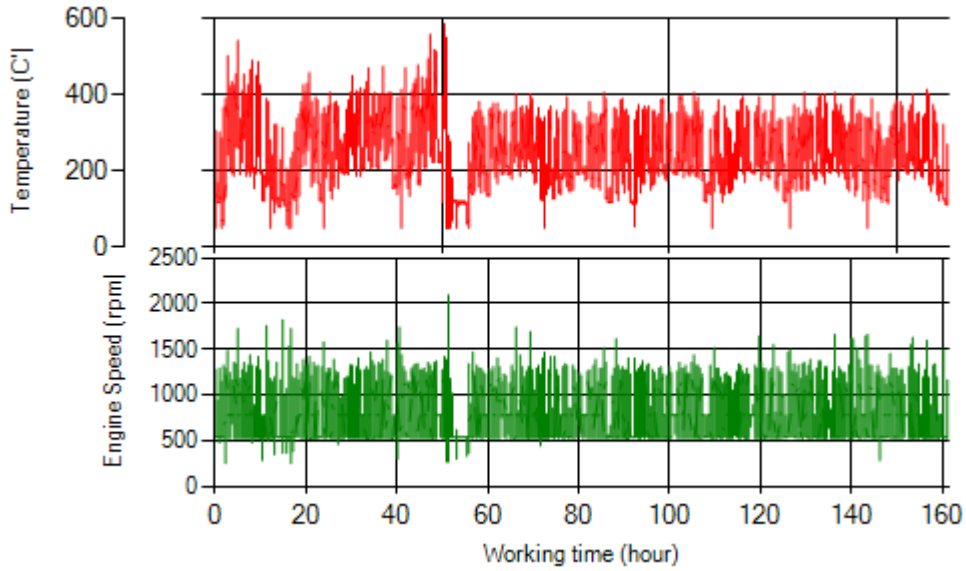


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

Considering 3 times maintenance and table 7 information, it could be concluded that **this DPF was not suitable for this path.**

Table 7. Tests information

Test No.	Start date	End date	System working days during the period
Number one	**02/Jun**	**17/Jun**	**8 days**
Number two	**22/Aug**	**01/Sep**	**10 days**
Number three	**05/Sep**	**07/Sep**	**3 days**

ASA Azmoon Sanat Arvin	Document Number: DPF2015092/1 Date: 11/Oct/2015

Notice: System was working over this period without DPF.

Overall Information

Table1- Overall Information

Vehicle plate number	33637 (34119)
CPK data logger number	LN: 001492, DN: 1933, Sim +989210000000
Bus line	Number 2 (west to east bus line)
Bus Terminals	Khavaran Bus Terminal - Western Bus Terminal
Total path distance	19 km
DPF company producer	Dinex_02 (Passive system with FBC)
Installation date	02/Jun/2015
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value - DPF upstream	2.00 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	DPF has been removed after two weeks working on Jun 17th. After receiving cleaning machine DPF was cleaned on Aug 10th and was installed on Aug 22nd but worked only for ten days. The last cleaning was done on Sep 24th but cleaning issue was unavoidable after only three days working. Finally DPF was replaced by muffler on Sep 8th and system have been working from that date without DPF.
Dosing status	Additive dosing was increased 60% of its initial value for tests two and three.

Table 3- Fuel and Additive Consumption Information

Bus mileage over the period	2190 km
Working days over the period	13 days
Stop days	2 days
Data logger working days	13 days
Working hours over the period	200 hours 23 minutes
Average working hours per day (including stop days)	13 hours 21 minutes
Bus average speed	10.93 km/hr
idle speed time to all working time ration	57.04 %
Total Bus fuel consumption over the period	1440 lit
Fuel consumption per hour	7.19 lit/hr
Average fuel consumption	0.66 lit/km

Temperature, Pressure and Engine Speed Overview

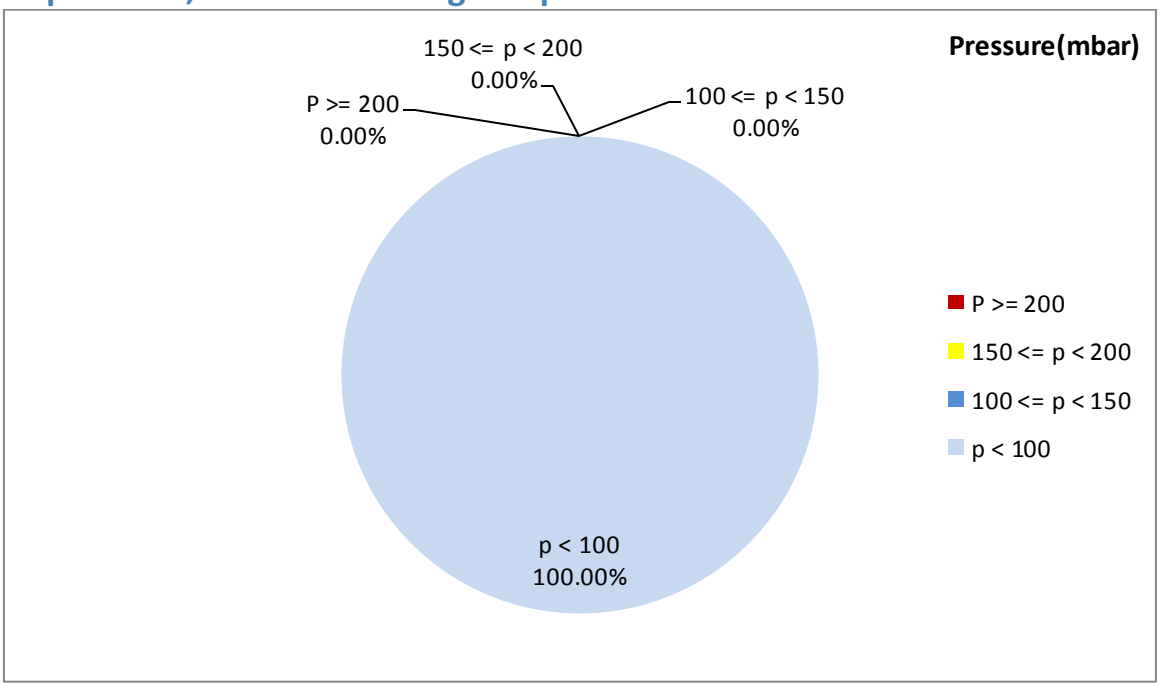


Figure 1- Pressure distribution over the working hours

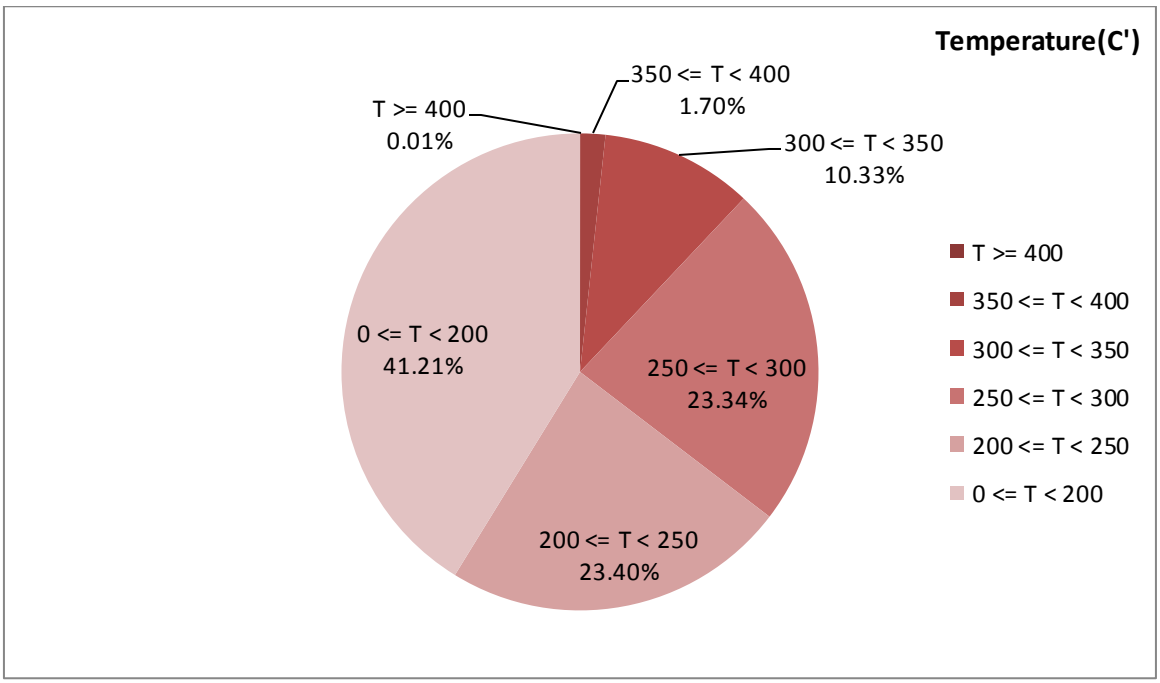


Figure 2-Temperature distribution over the working hours

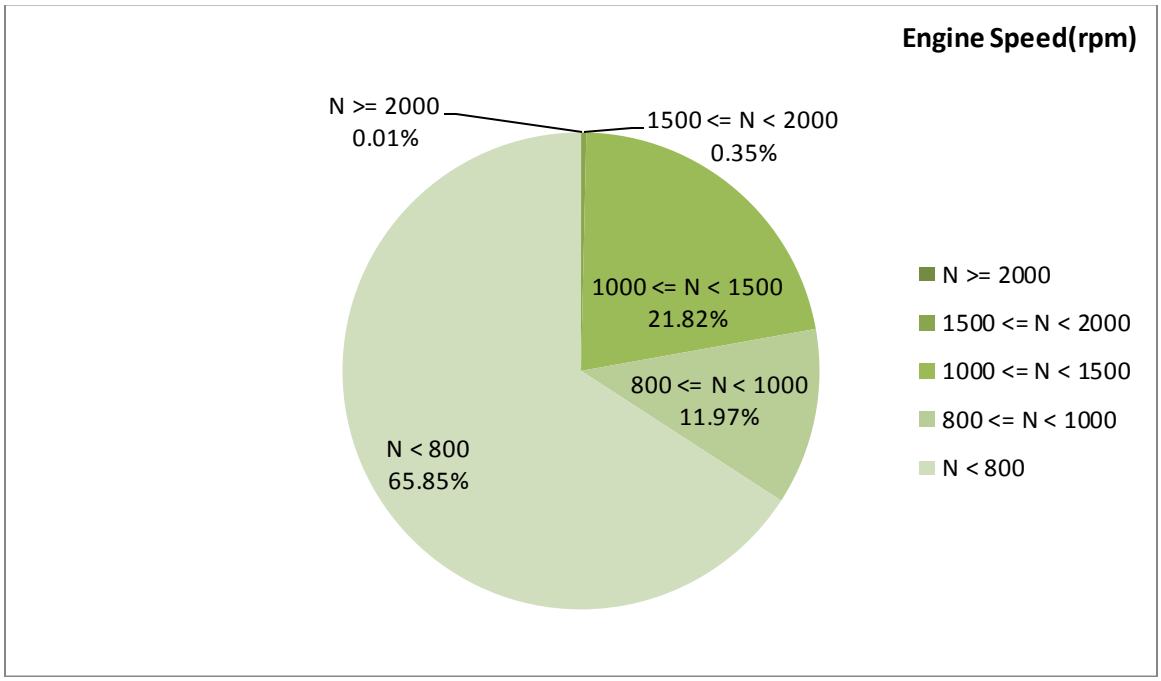


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
219.66	1.61	769

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
269.17	3.74	978

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
410-50	90-0	2128-272

Detailed Pressure Analysis

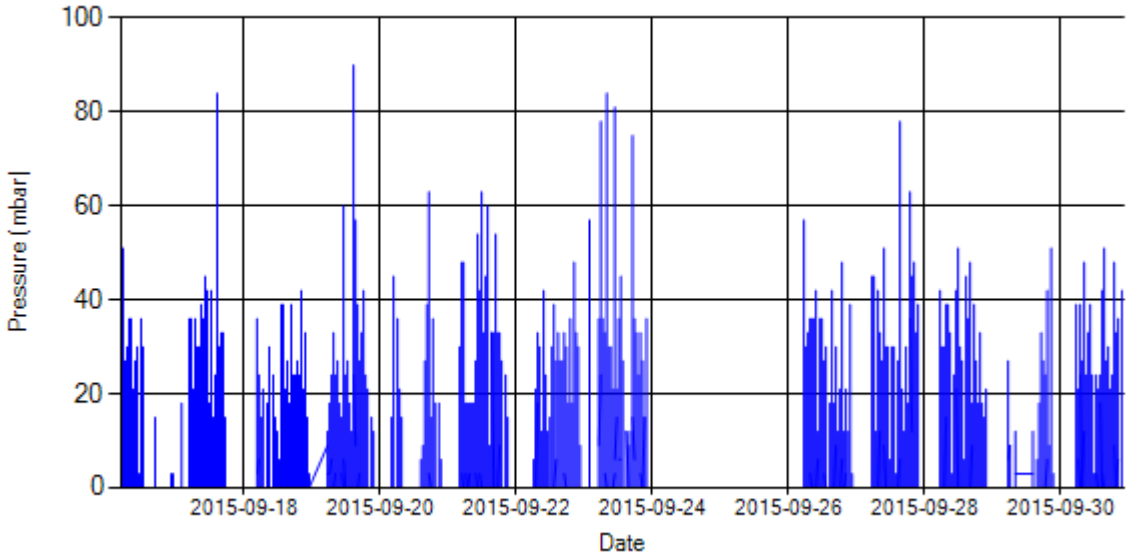


Figure 4- Pressure distribution over the period

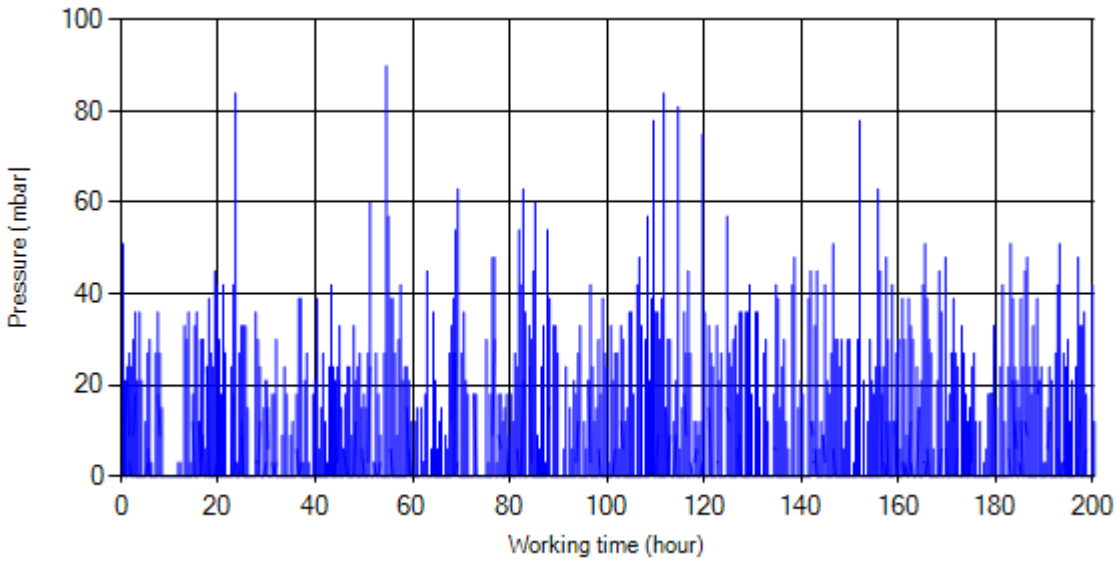


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

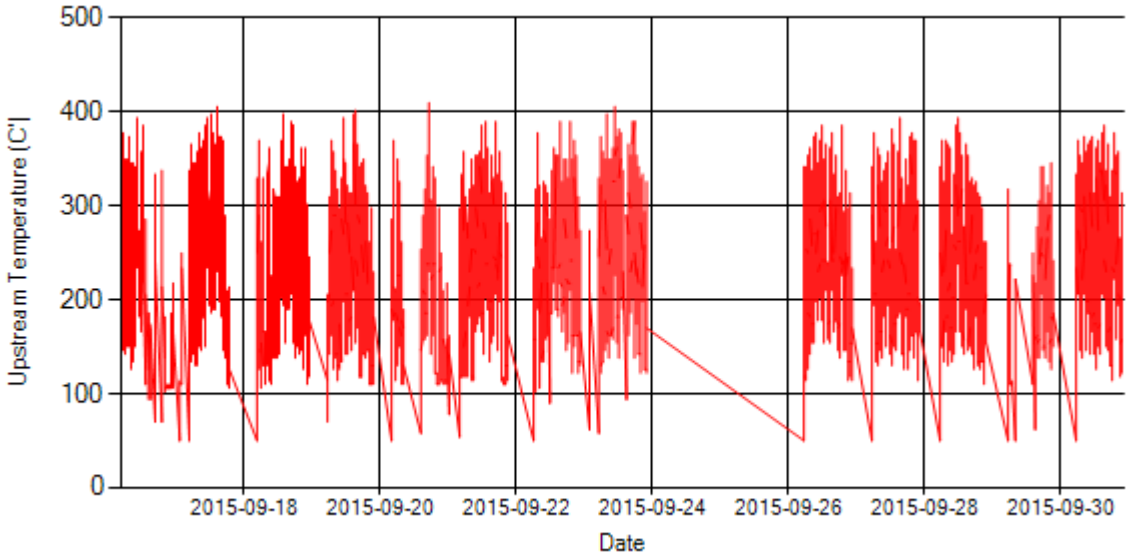


Figure 6- Temperature distribution over the period

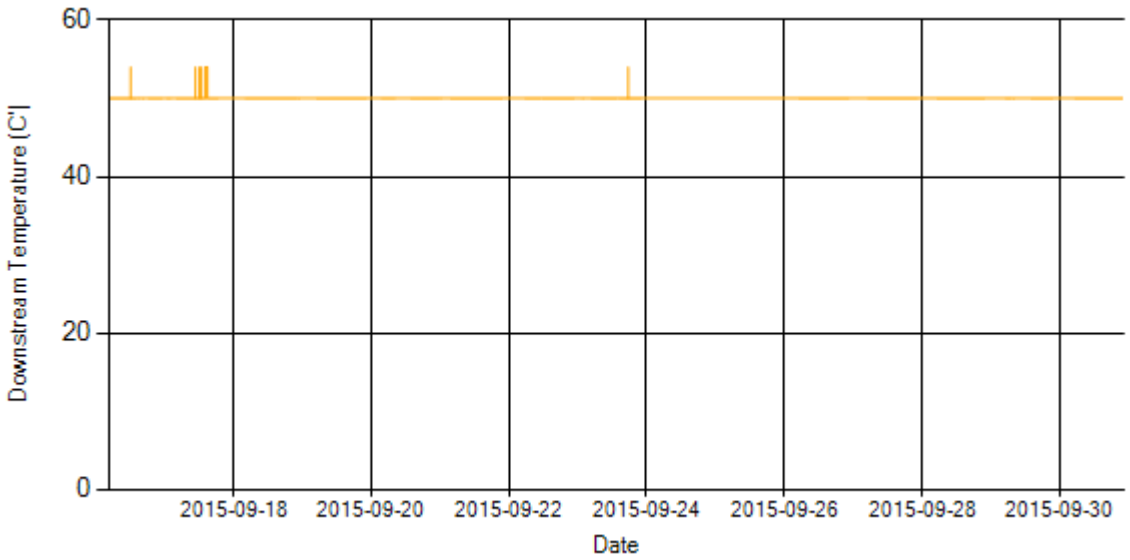


Figure 7- Temperature distribution over the period

Notice: Temp 2 sensor had problem during this period.

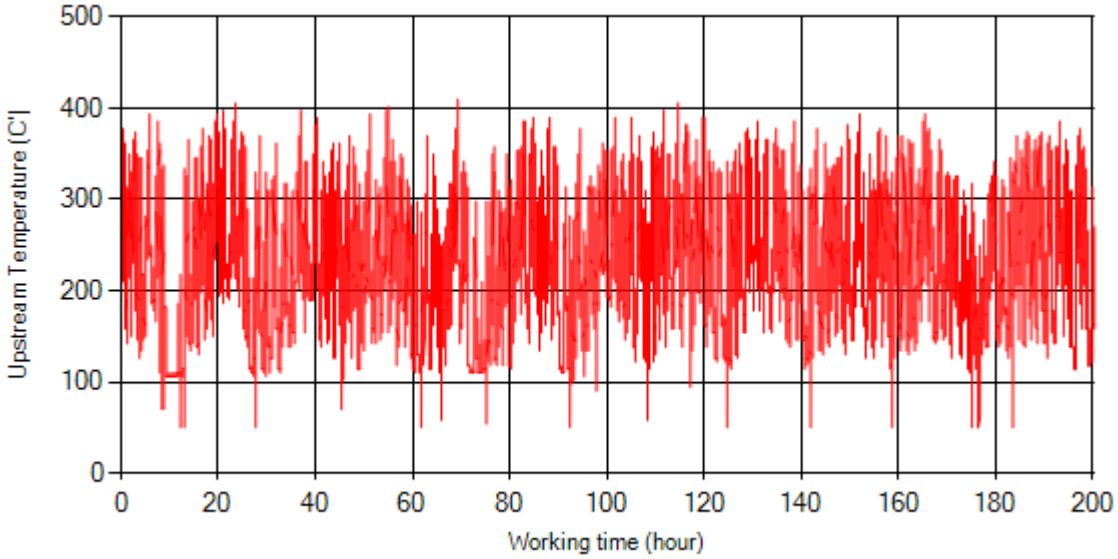


Figure 8- Temperature vs. working hours

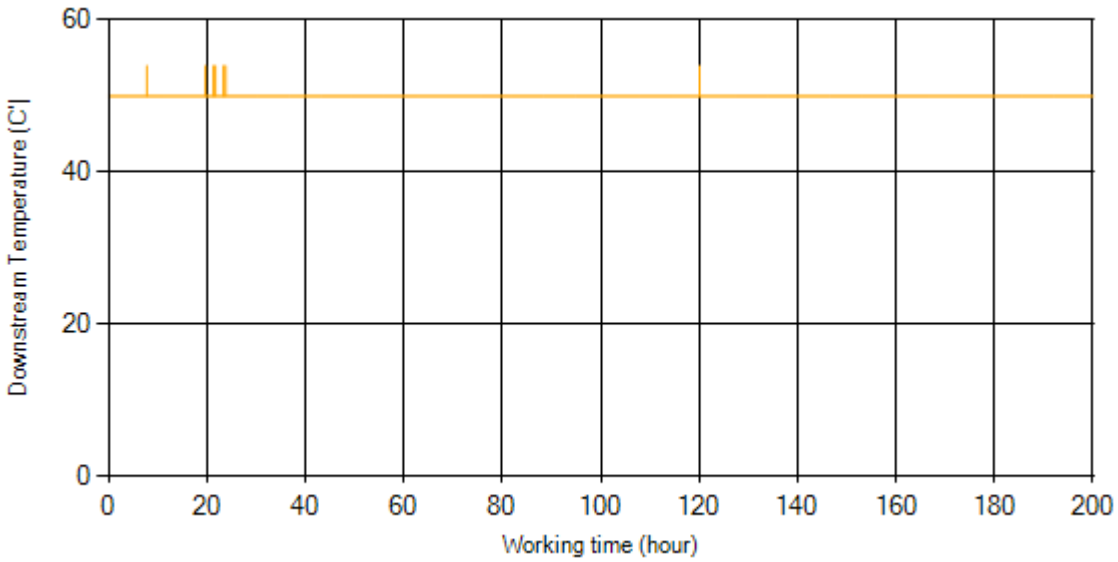


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

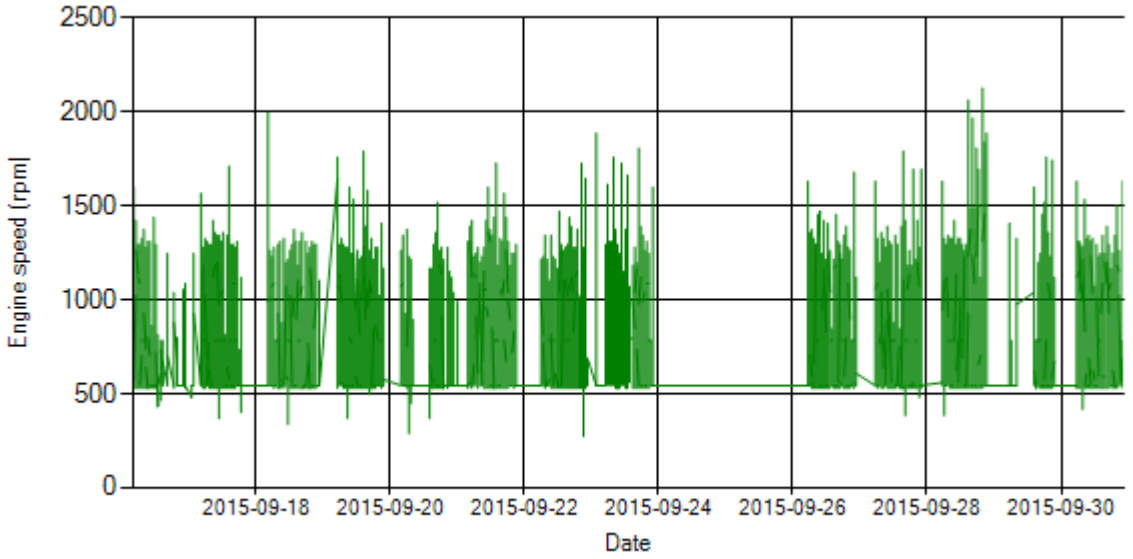


Figure 10- Engine speed distribution over the period

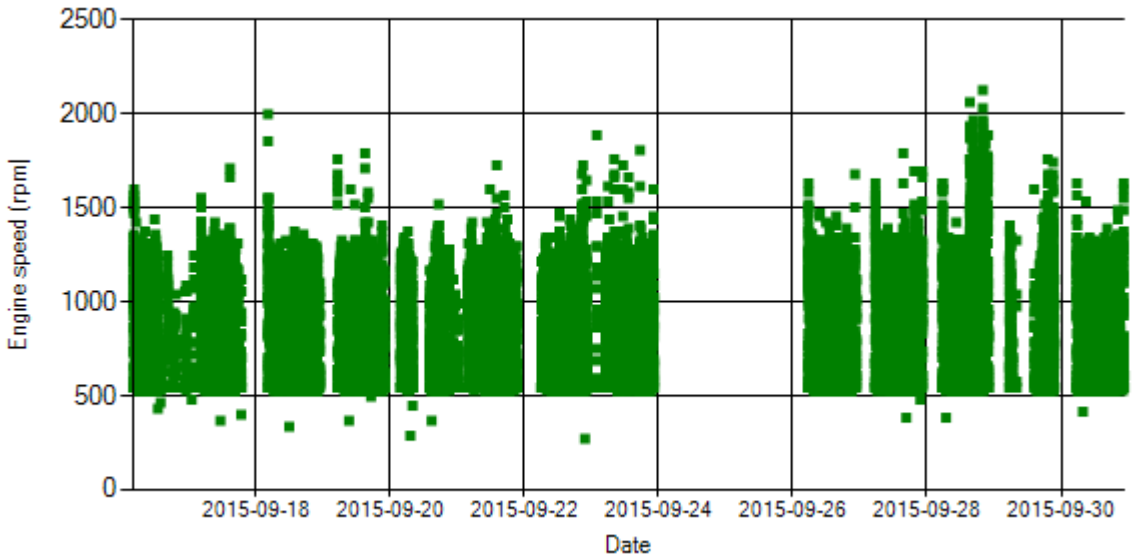


Figure 11- Engine speed diagram for calculating CPK's working days

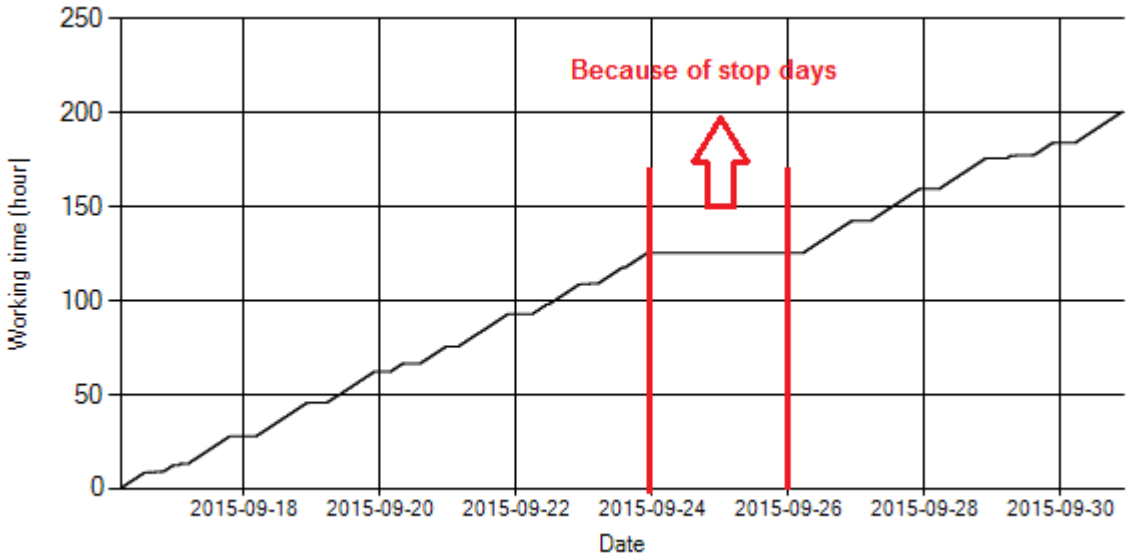


Figure 12- Time diagram for calculating CPK's working days

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

Pressure-Engine Speed diagrams

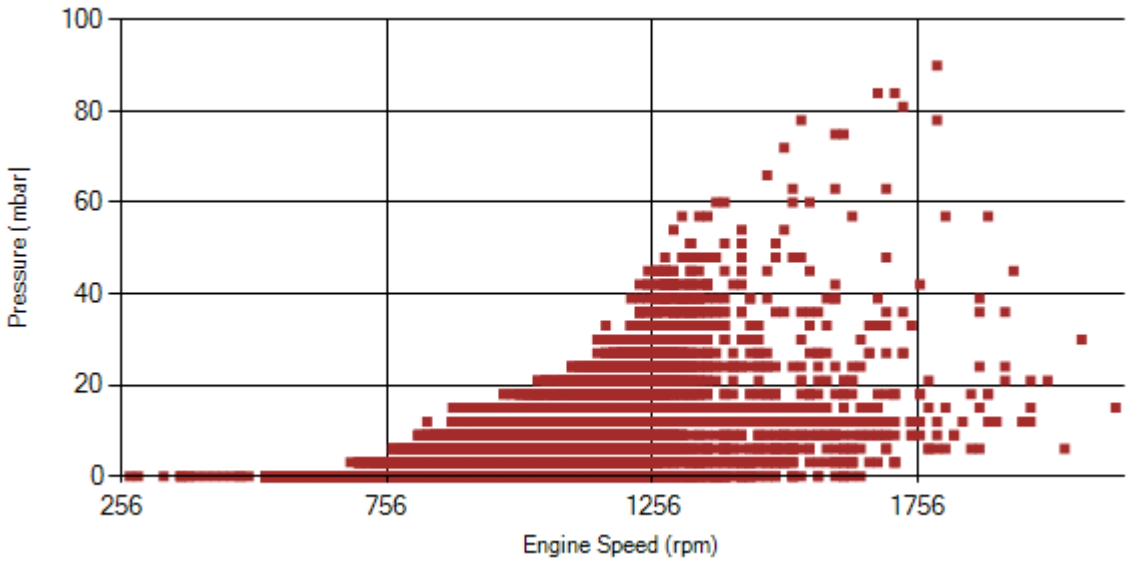


Figure 13- Pressure against engine speed

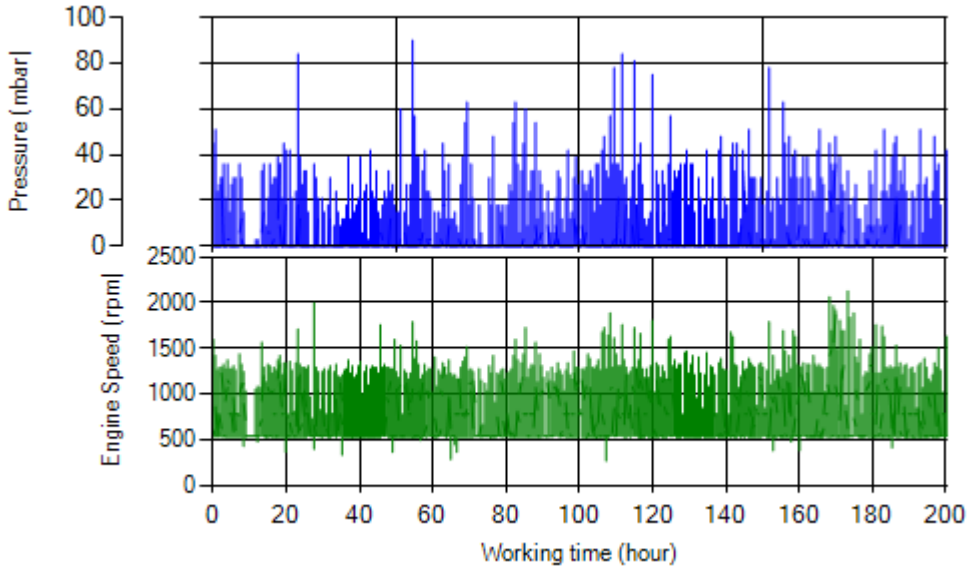


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

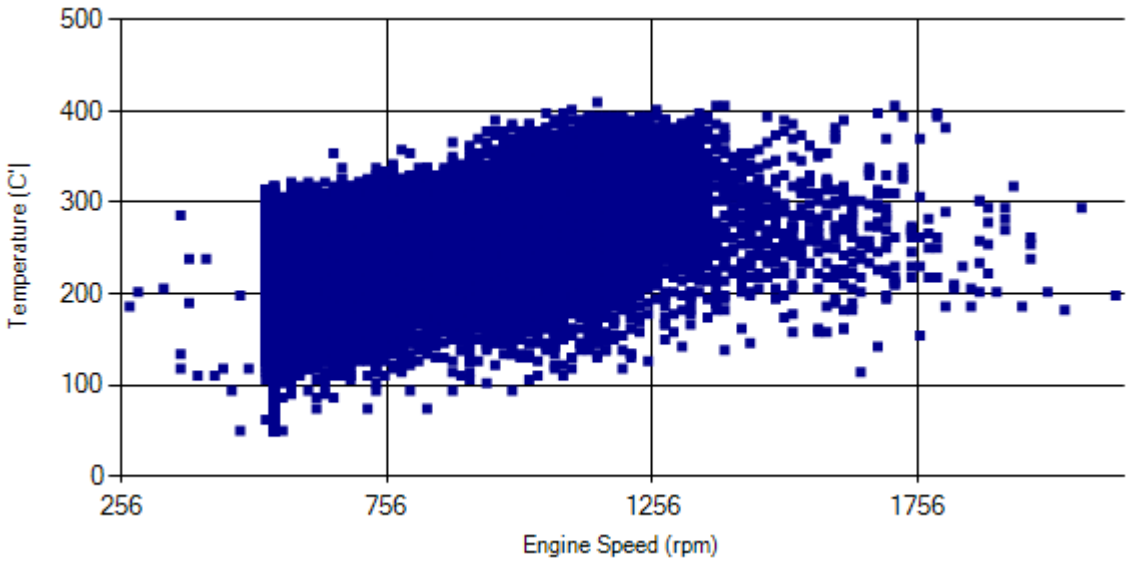


Figure 15- Temperature against engine speed

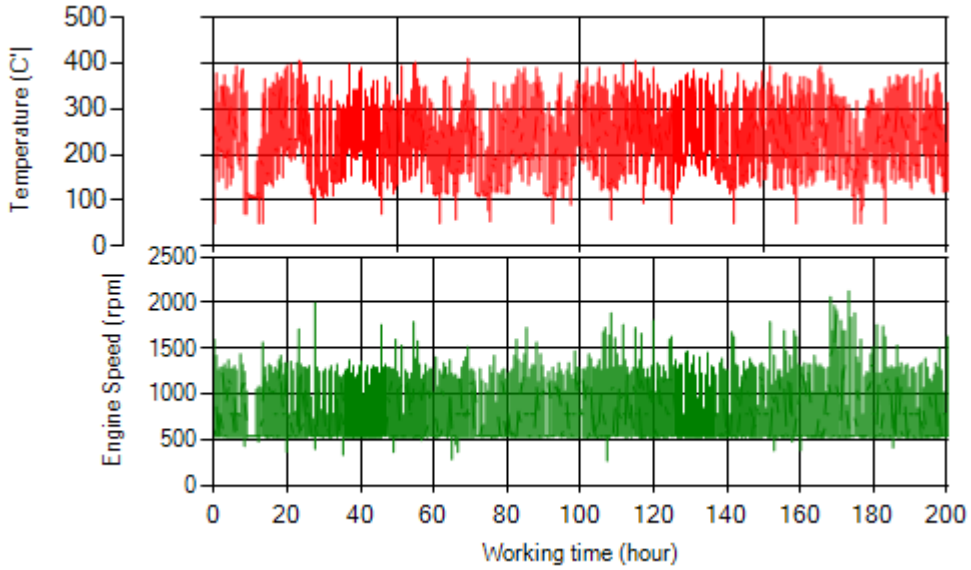
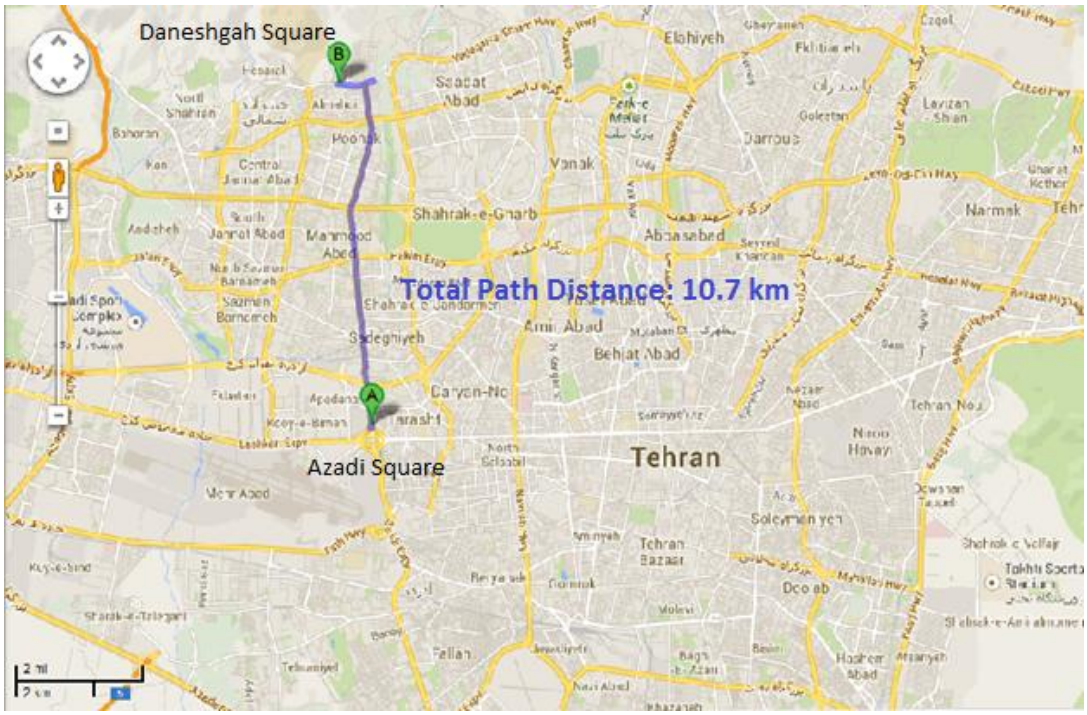


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

Notice: System was working over this period without DPF.

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



Overall Information

Table1- Overall Information

Vehicle plate number	85476
CPK data logger number	LN: 001508, DN: 2003, Sim +989218469624
Bus line	Number 10 (south to north Bus line)
Bus Terminals	Azadi square - Daneshgah square
Total path distance	10.7 km
DPF producer company	HJS_04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	01/Sep/2015 – 15/Sep/2015 (fifteen days)
K value - DPF upstream	1.84 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	- km
Bus mileage over the period	- km
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	218 hours 1 minutes
Average working hours per day (including stop days)	14 hours 31 minutes
Bus average speed	8.69 km/hr
idle speed time to all working time ration	57.47 %
Total Bus fuel consumption over the period	-
Fuel consumption per hour	-
Average fuel consumption	-
Total Bus additive consumption over the period	0.64 lit
Average additive consumption	-
Additive consumption to fuel ration	-

Notice: Bus mileage and fuel consumption were not available for this period.

Temperature, Pressure and Engine Speed Overview

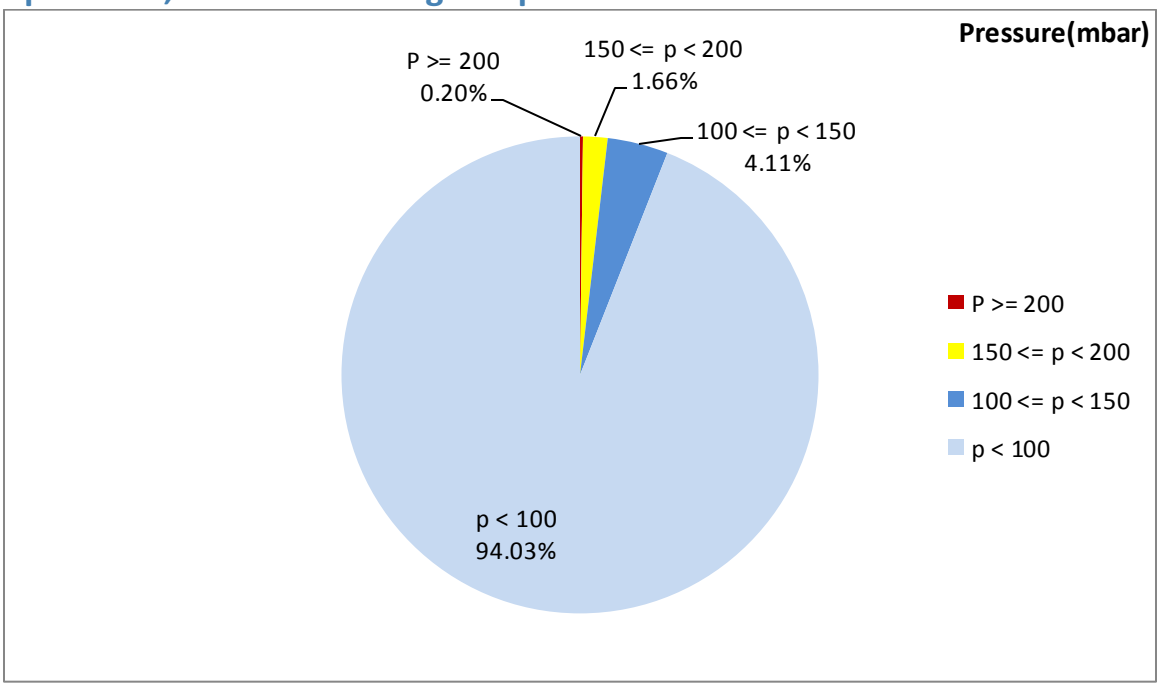


Figure 1- Pressure distribution over the working hours

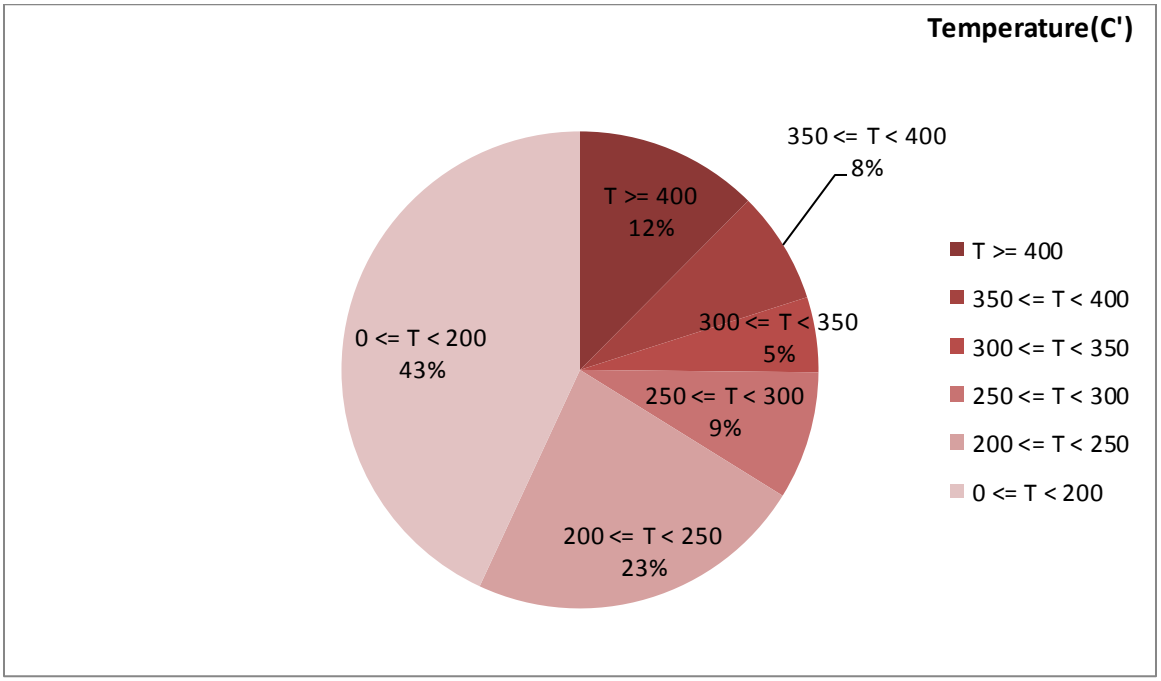


Figure 2-Temperature distribution over the working hours

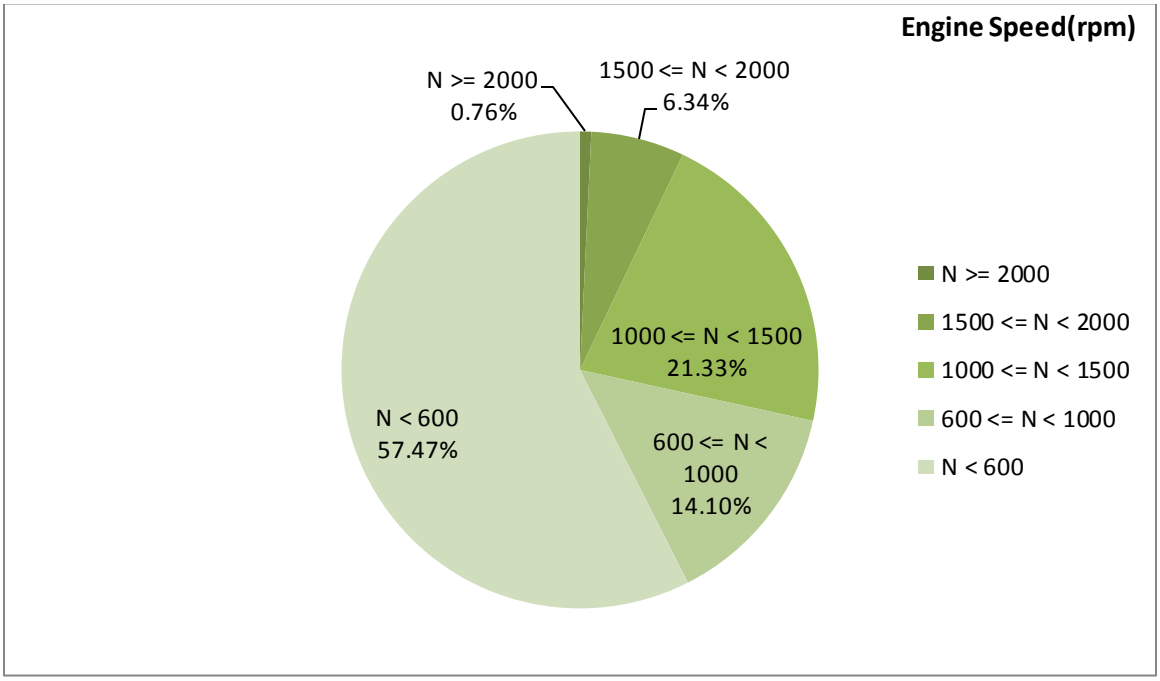


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
243.82	26.62	828

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
298.02	49.89	1165

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
554-50	273-3	2656-256

Detailed Pressure Analysis

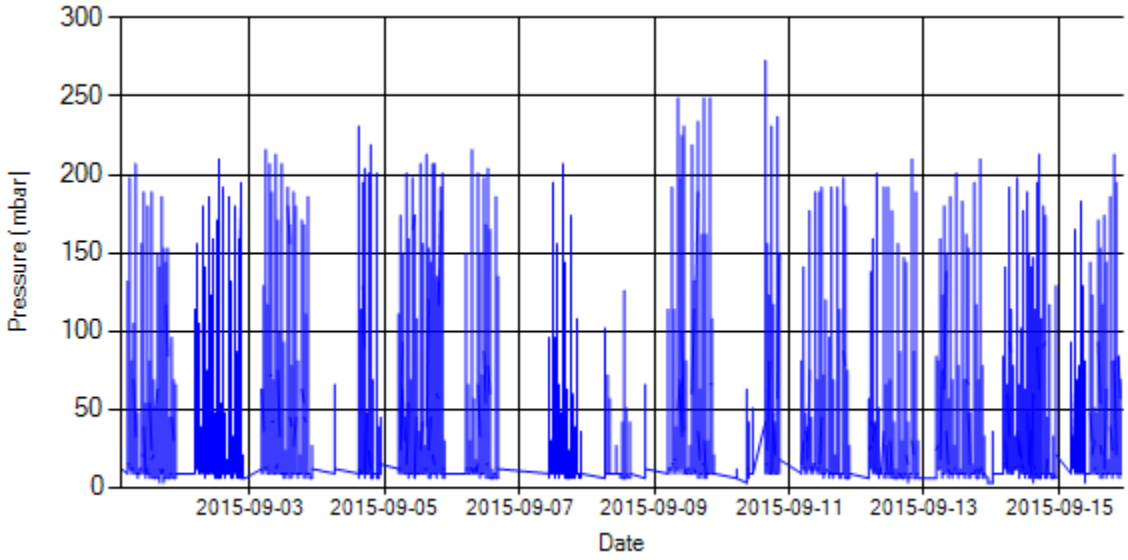


Figure 4- Pressure distribution over the period

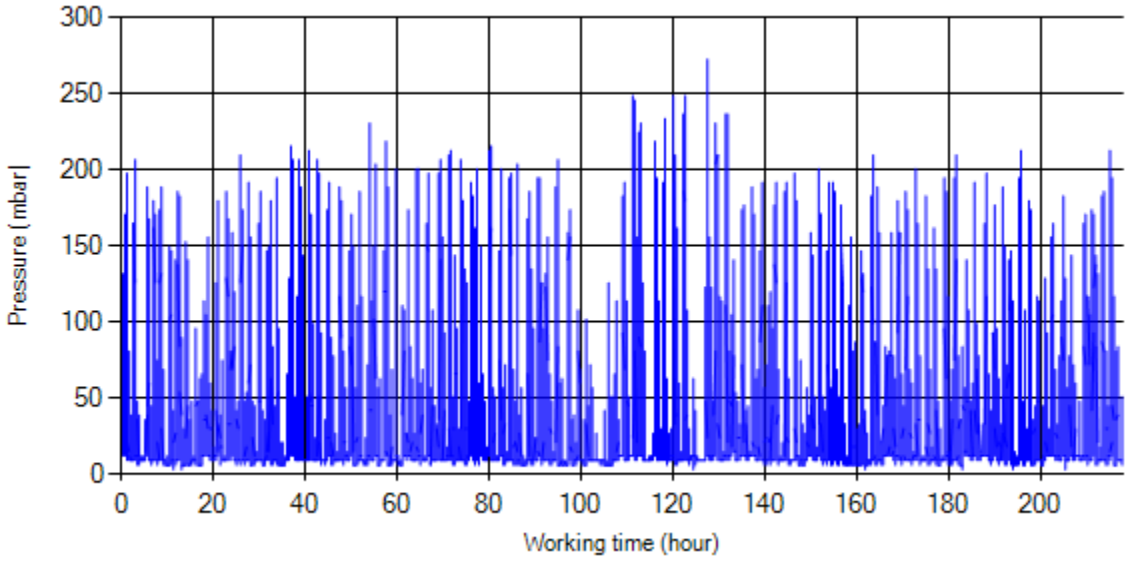


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

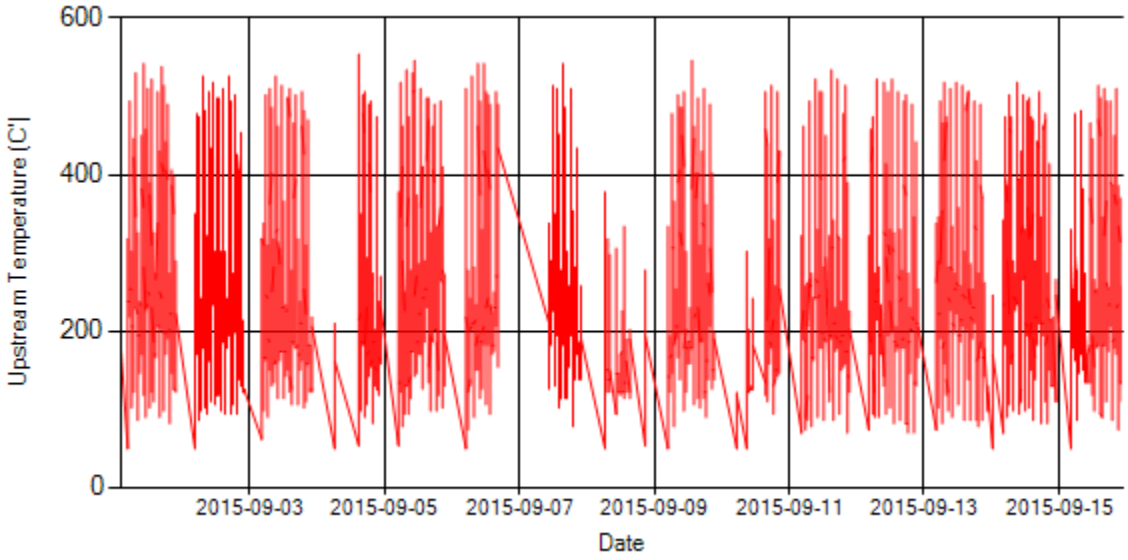


Figure 6- Temperature distribution over the period

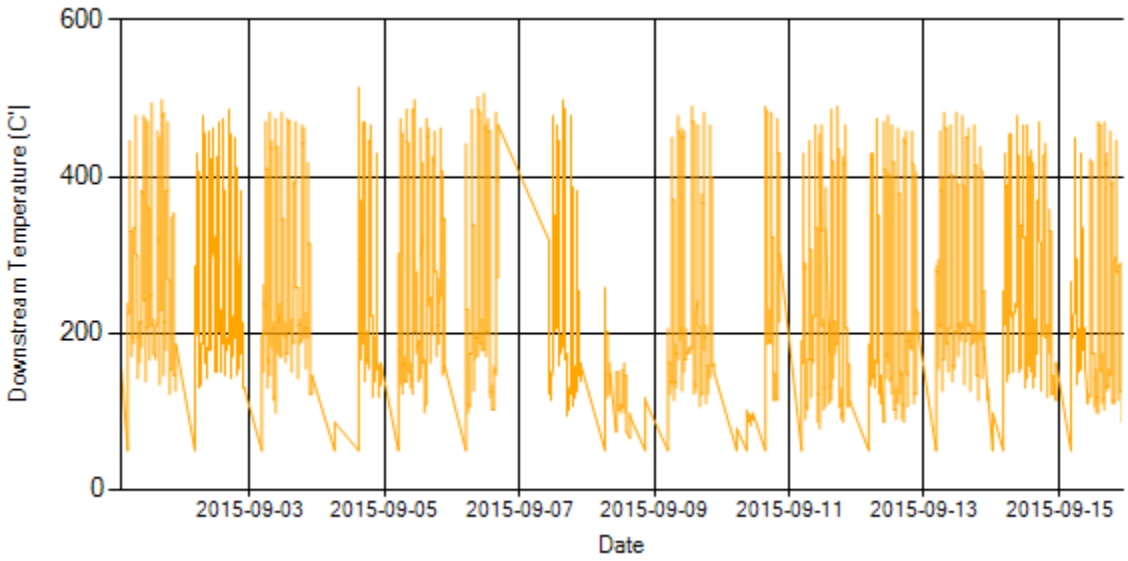


Figure 7- Temperature distribution over the period

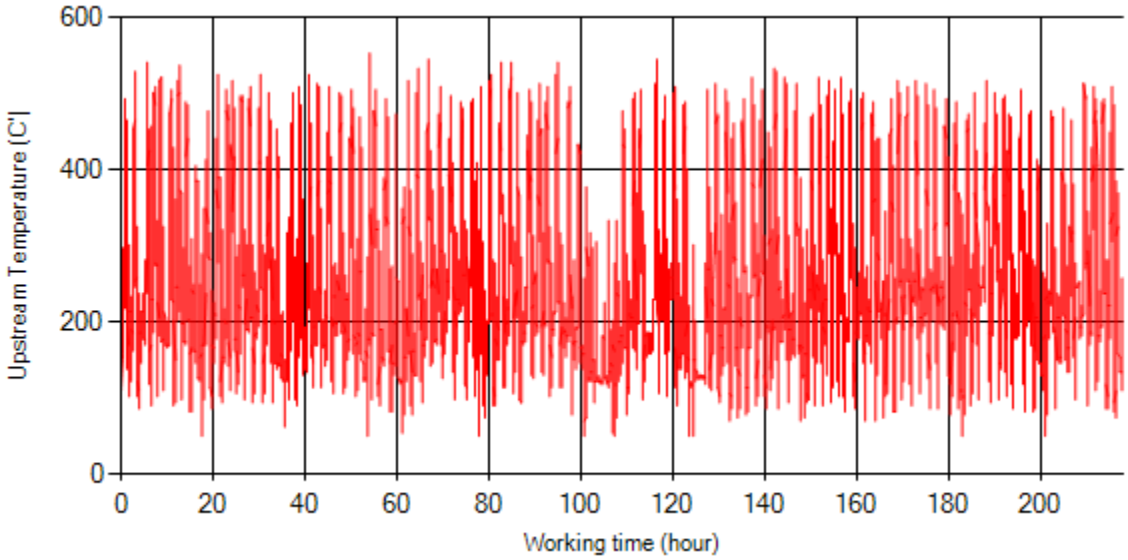


Figure 8- Temperature vs. working hours

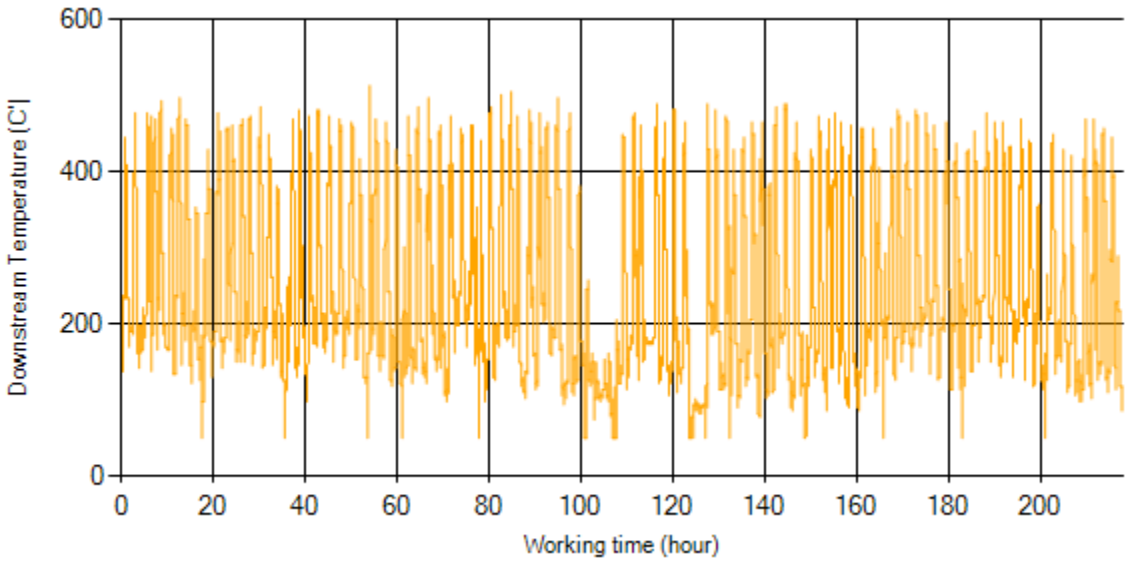


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

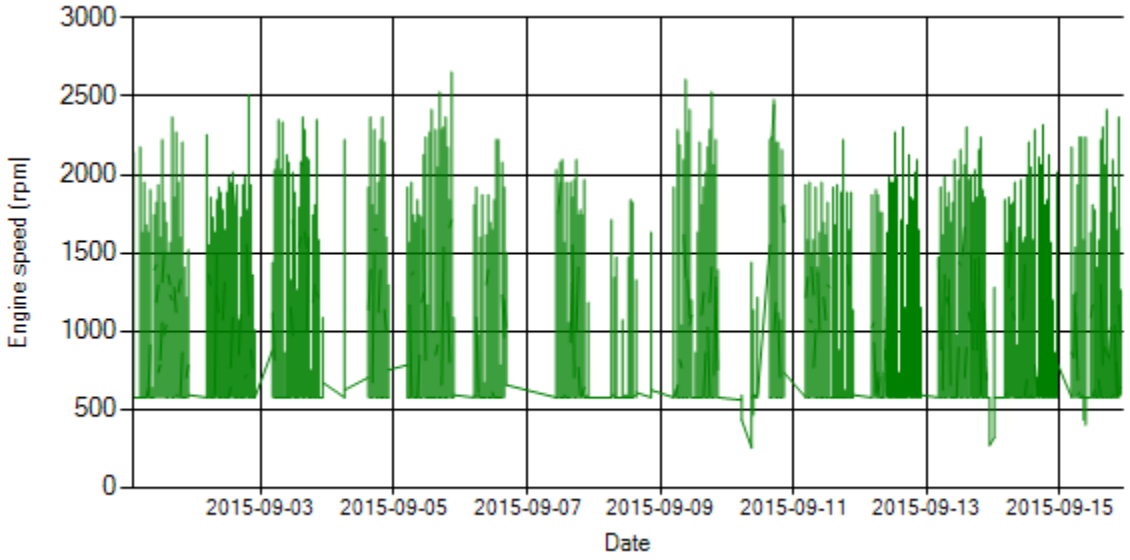


Figure 10- Engine speed distribution over the period

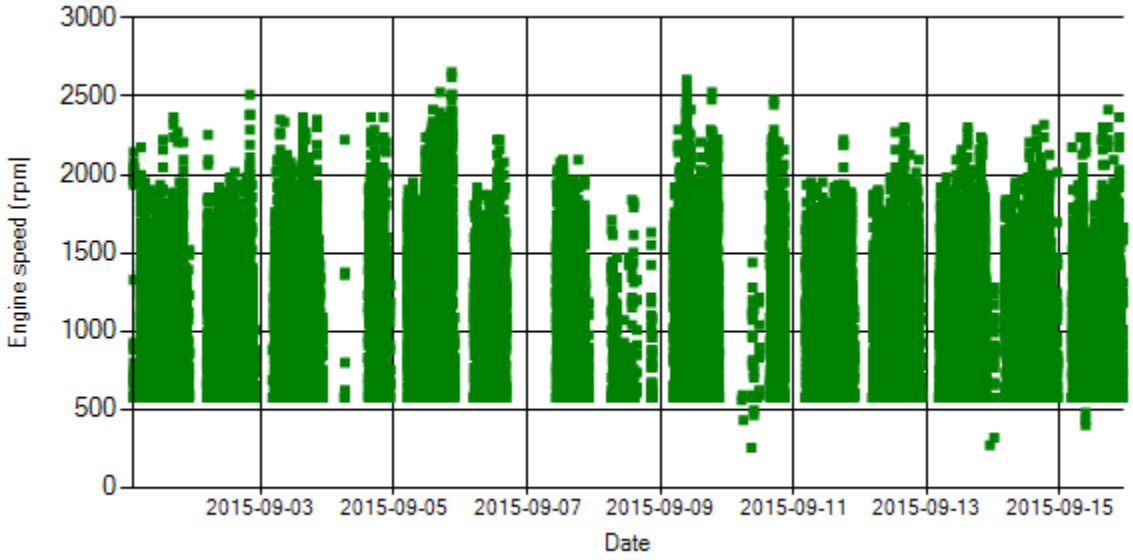


Figure 11- Engine speed diagram for calculating CPK's working days

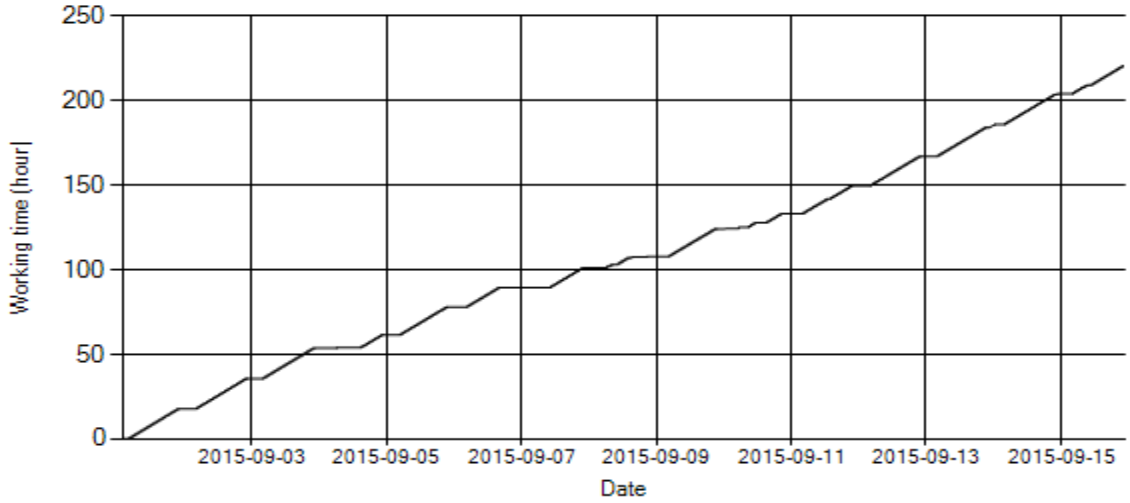


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger was sampling all over the period.

Pressure-Engine Speed diagrams

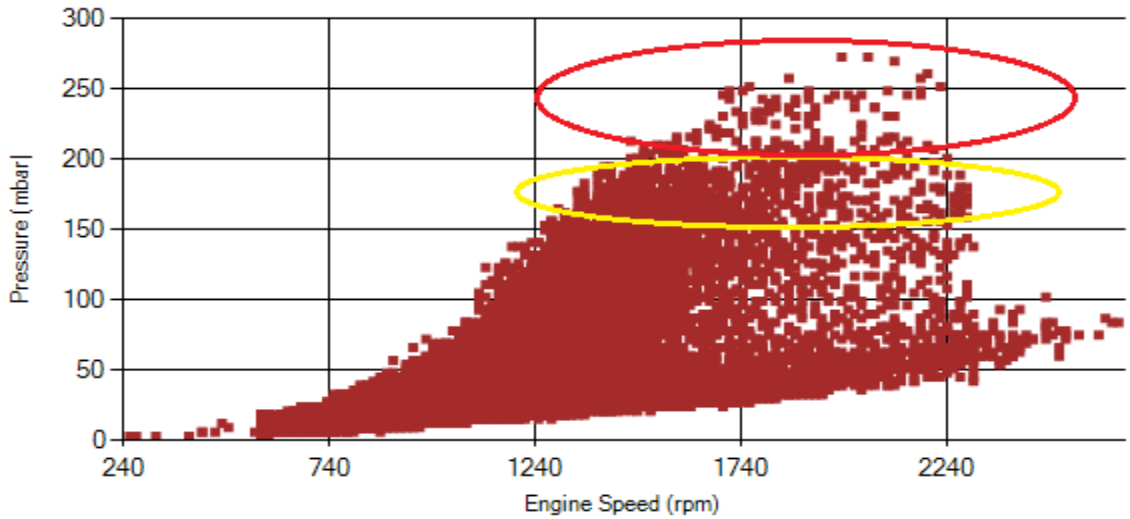


Figure 13- Pressure against engine speed

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

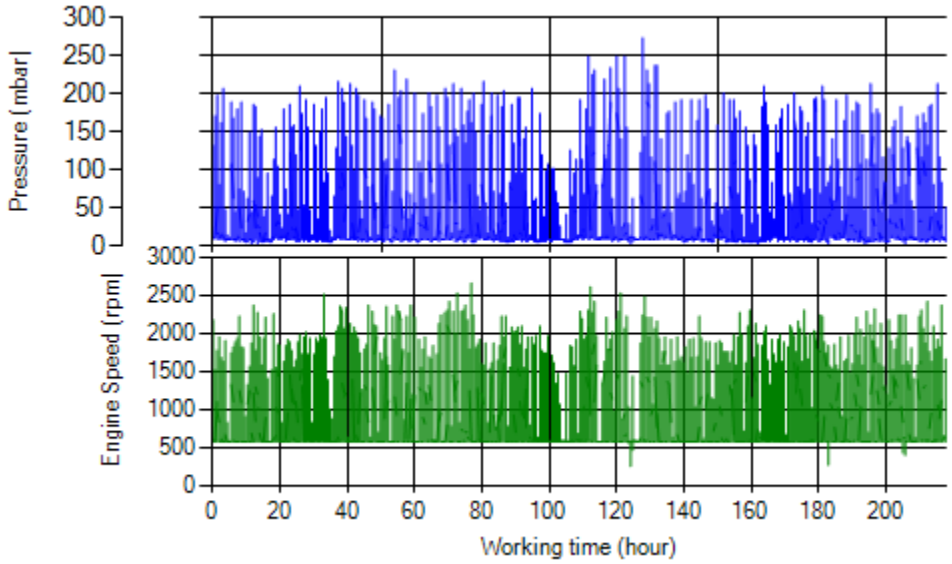


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

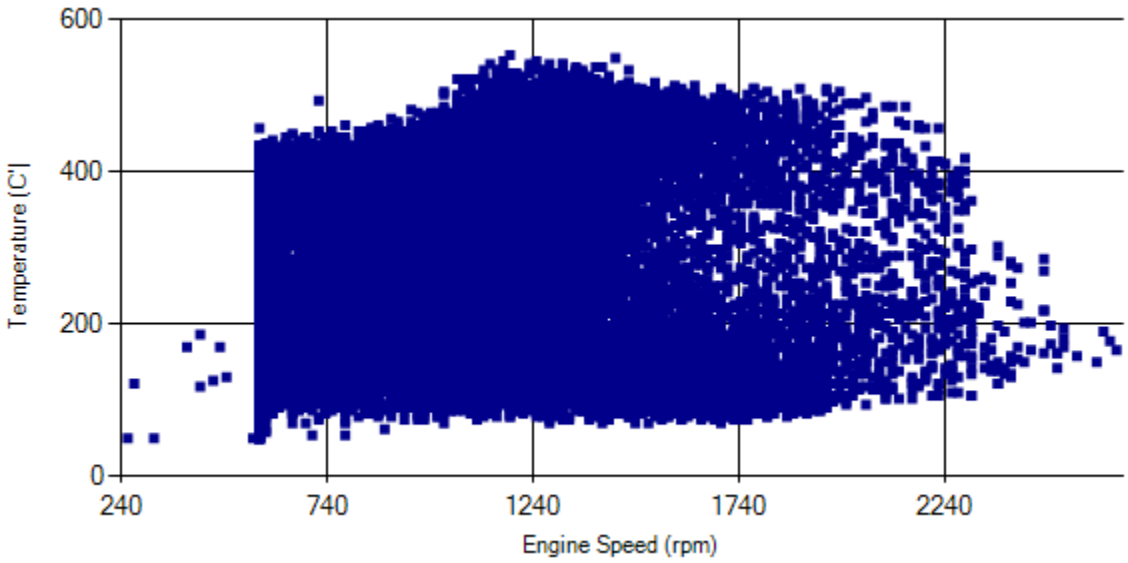


Figure 15- Temperature against engine speed

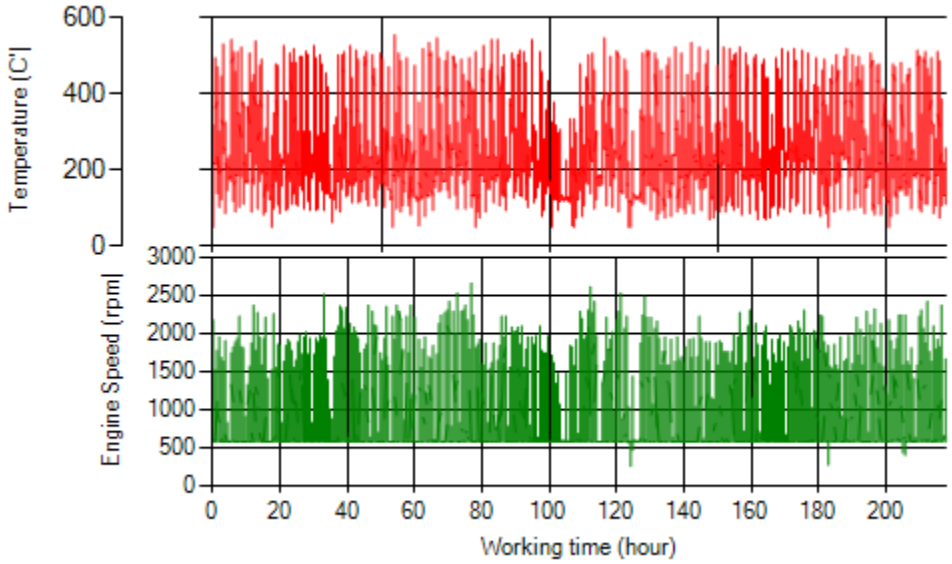


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0. 2% of total working time pressure is above 200 mbar and 1.86% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 12% of total working-time temperature is above 400 °C and 20% above 350°C.

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

Overall Information

Table1- Overall Information

Vehicle plate number	85476
CPK data logger number	LN: 001508, DN: 2003, Sim +989218469624
Bus line	Number 10 (south to north Bus line)
Bus Terminals	Azadi square - Daneshgah square
Total path distance	10.7 km
DPF producer company	HJS_04 (Passive system with FBC)
Installation date	23/Feb/2015
Report period	16/Sep/2015 – 30/Sep/2015 (fifteen days)
K value - DPF upstream	1.84 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

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

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	32968 km
Bus mileage over the period	-
Working days over the period	15 days
Stop days	0 day
Data logger working days	15 days
Working hours over the period	180 hours 37 minutes
Average working hours per day (including stop days)	12 hours 2 minutes
Bus average speed	10.85 km/hr
idle speed time to all working time ration	-
Total Bus fuel consumption over the period	-
Fuel consumption per hour	-
Average fuel consumption	-
Total Bus additive consumption over the period	0.5 lit
Average additive consumption	-
Additive consumption to fuel ration	-

Notice: Bus mileage and fuel consumption were not available for this period.
Notice: RPM sensor had problem during this period.

Temperature, Pressure and Engine Speed Overview

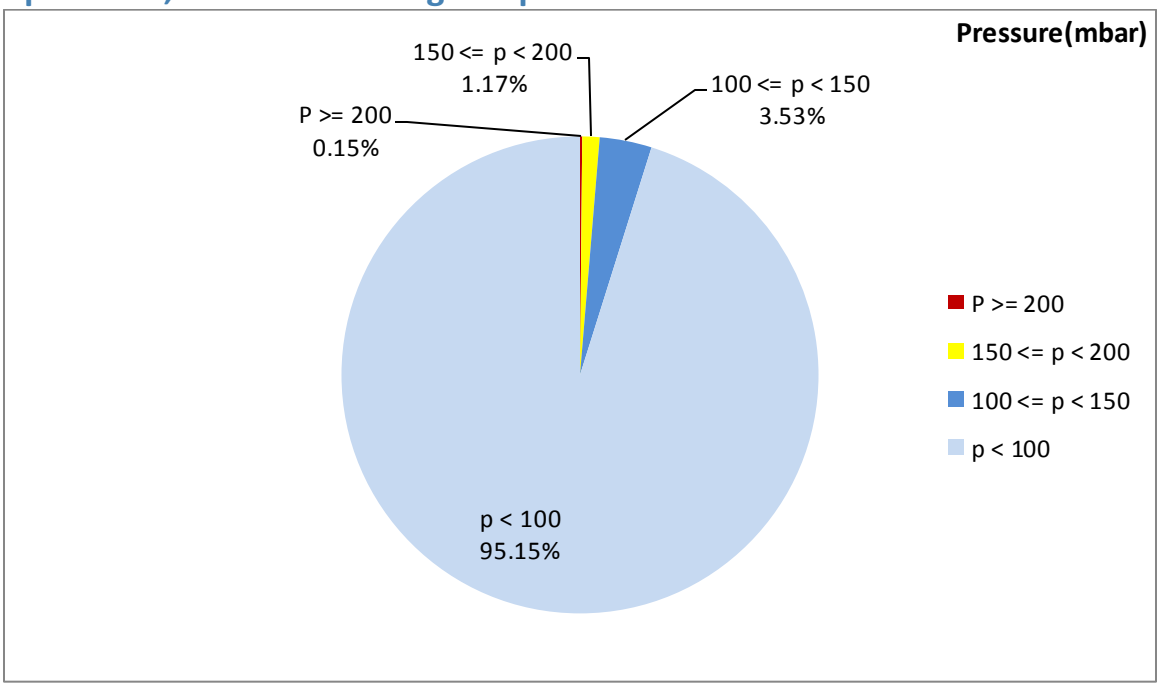


Figure 1- Pressure distribution over the working hours

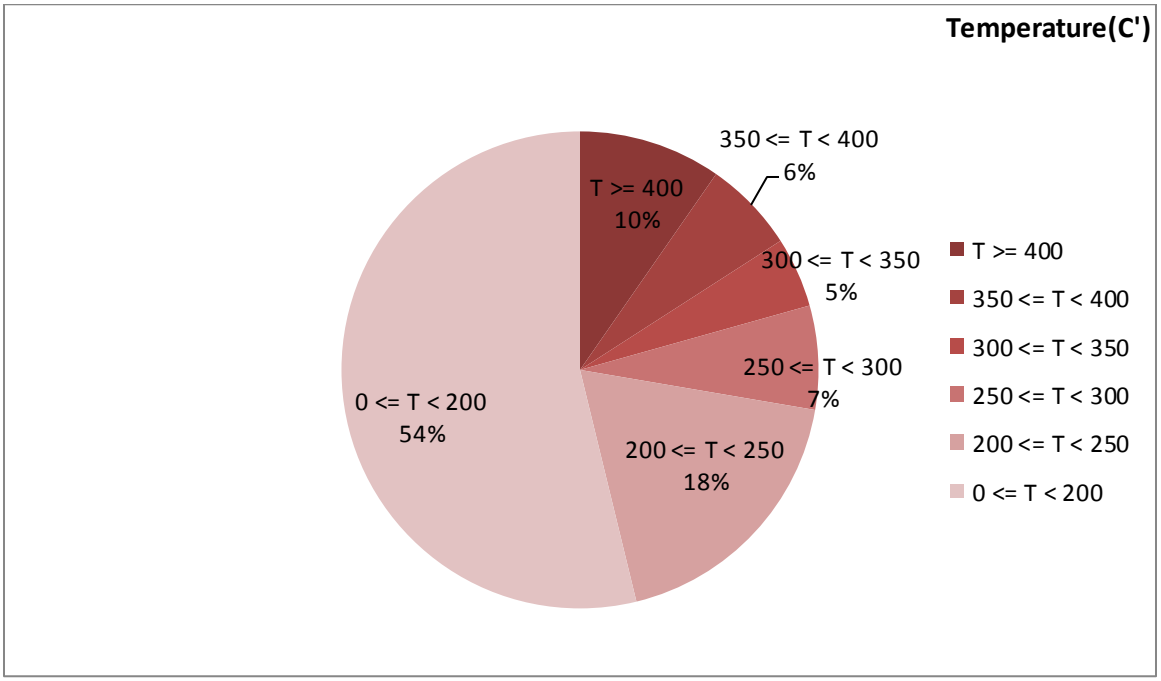


Figure 2-Temperature distribution over the working hours

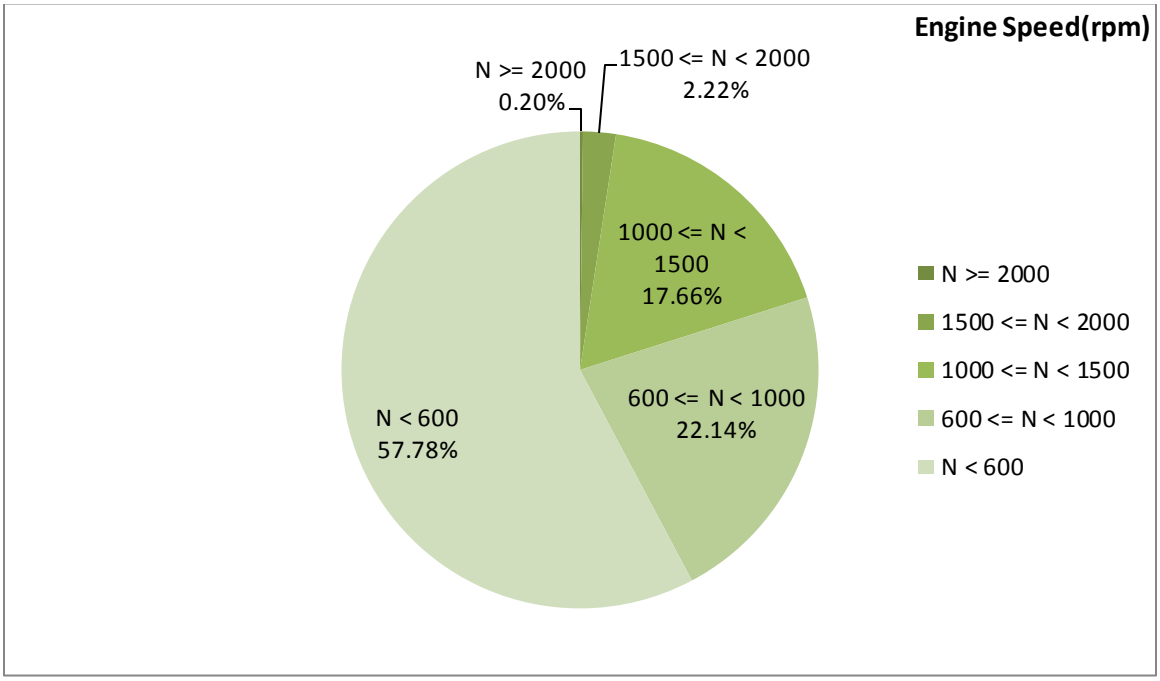


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
222.89	25.13	-

Table 5- Mean values without idling

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

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
538-50	261-0	2560-0

Notice: RPM sensor had problem during this period, so some related parameters was lef blank.

Detailed Pressure Analysis

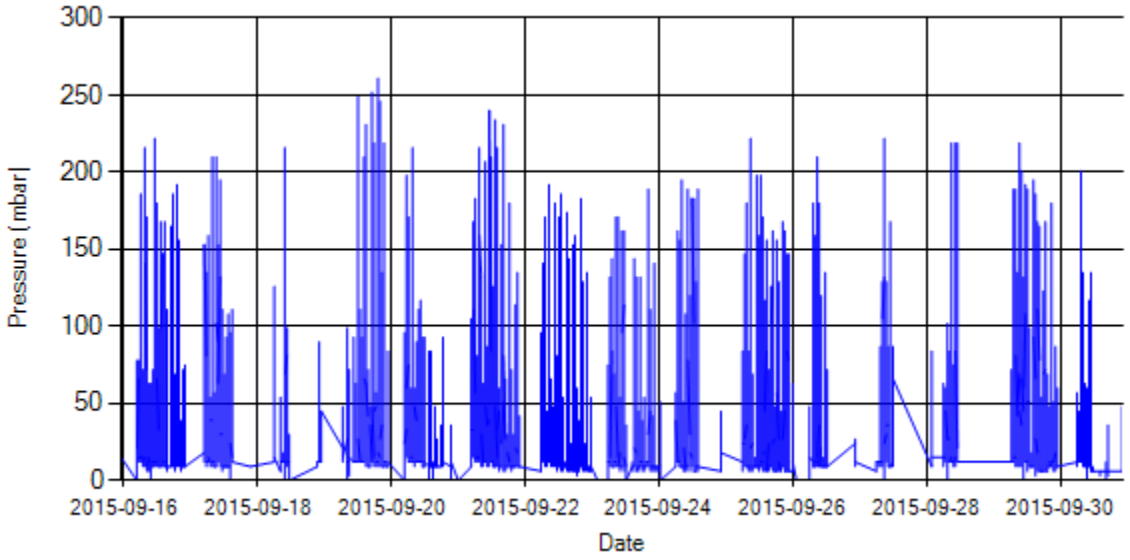


Figure 4- Pressure distribution over the period

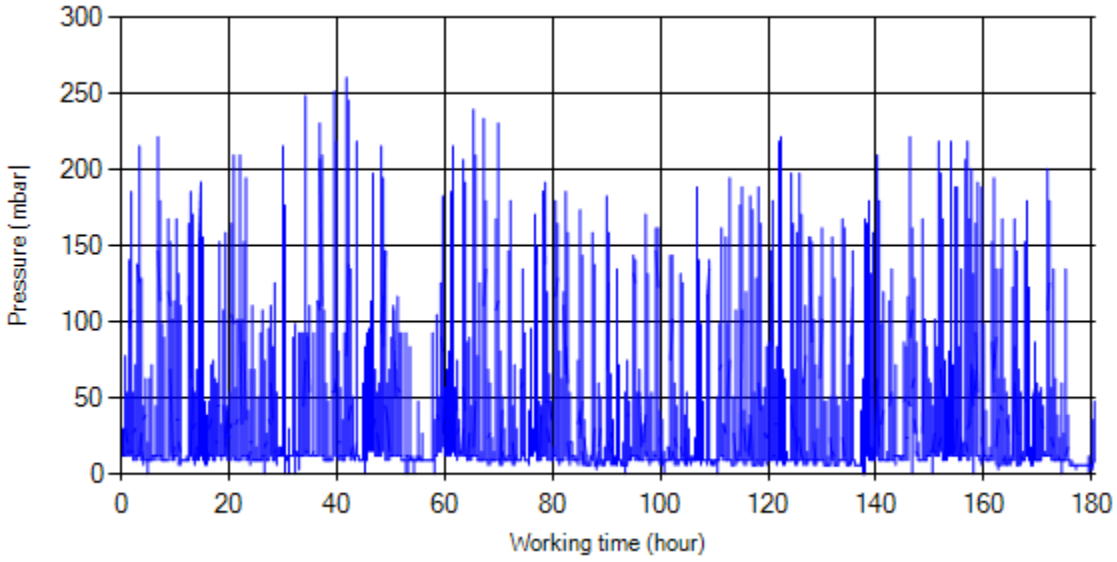


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

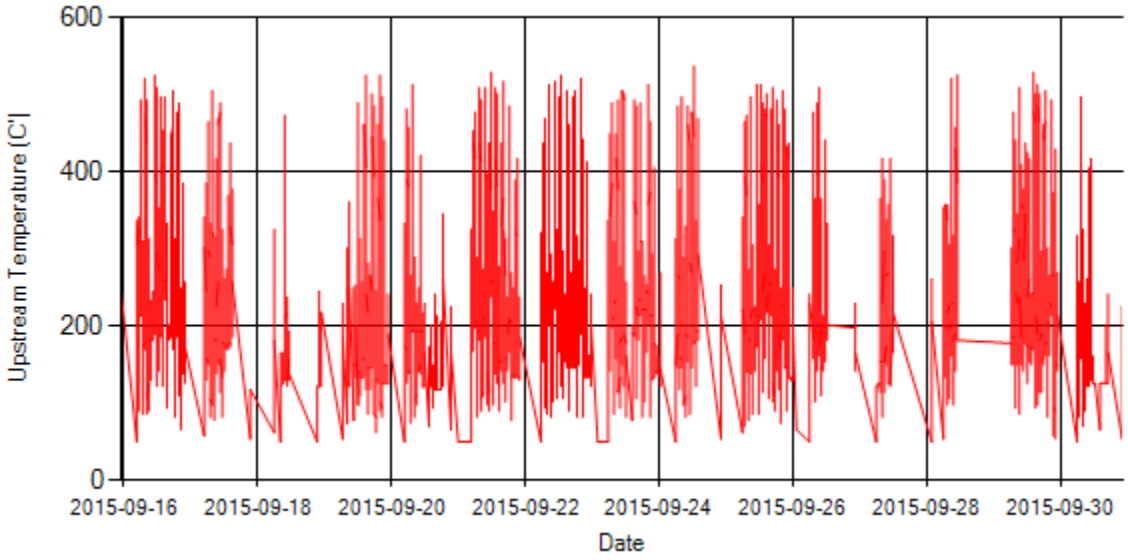


Figure 6- Temperature distribution over the period

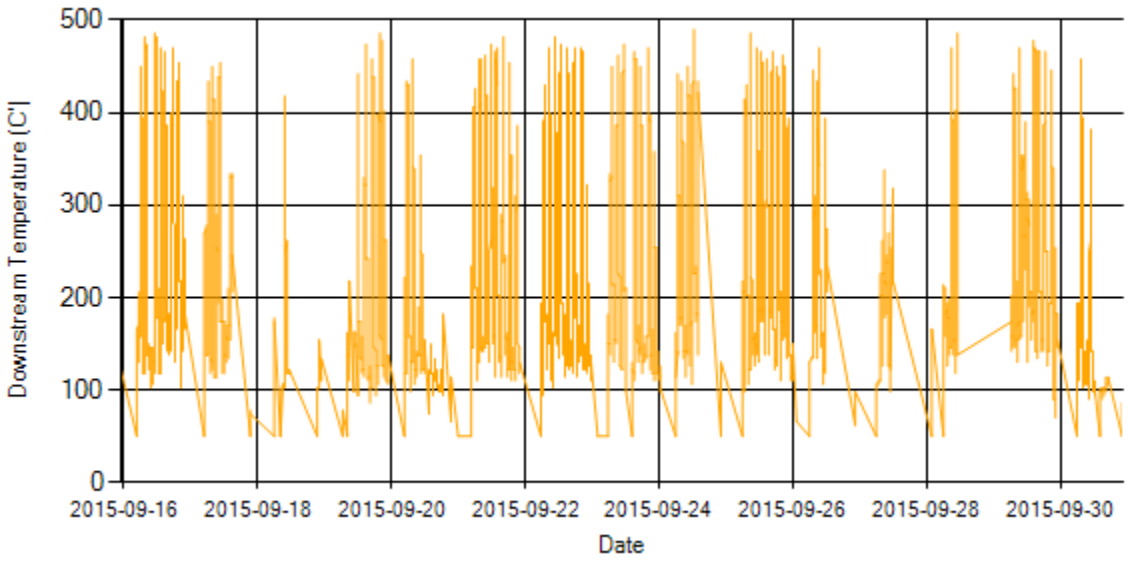


Figure 7- Temperature distribution over the period

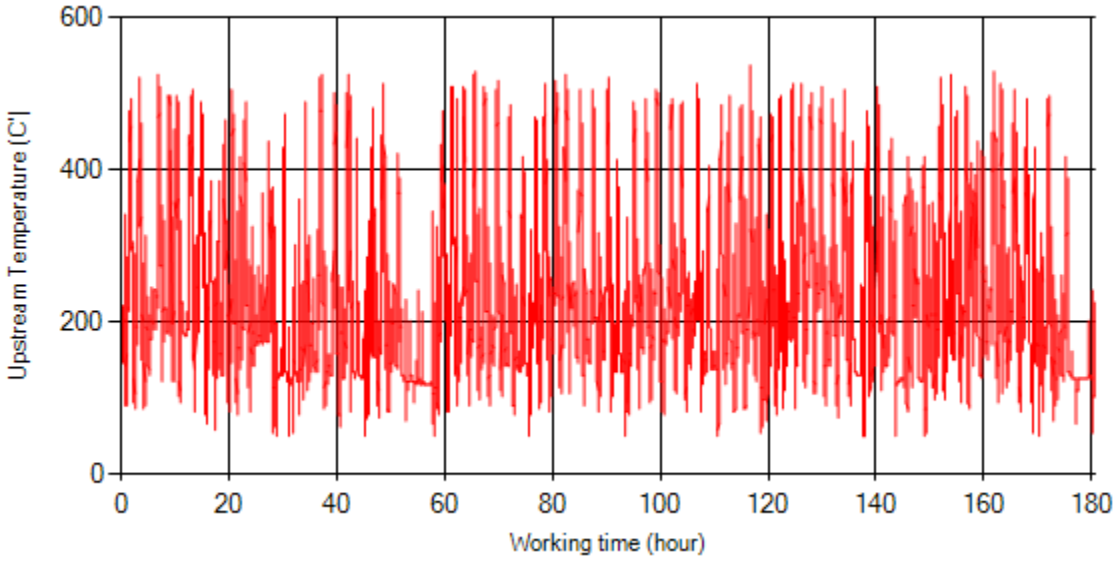


Figure 8- Temperature vs. working hours

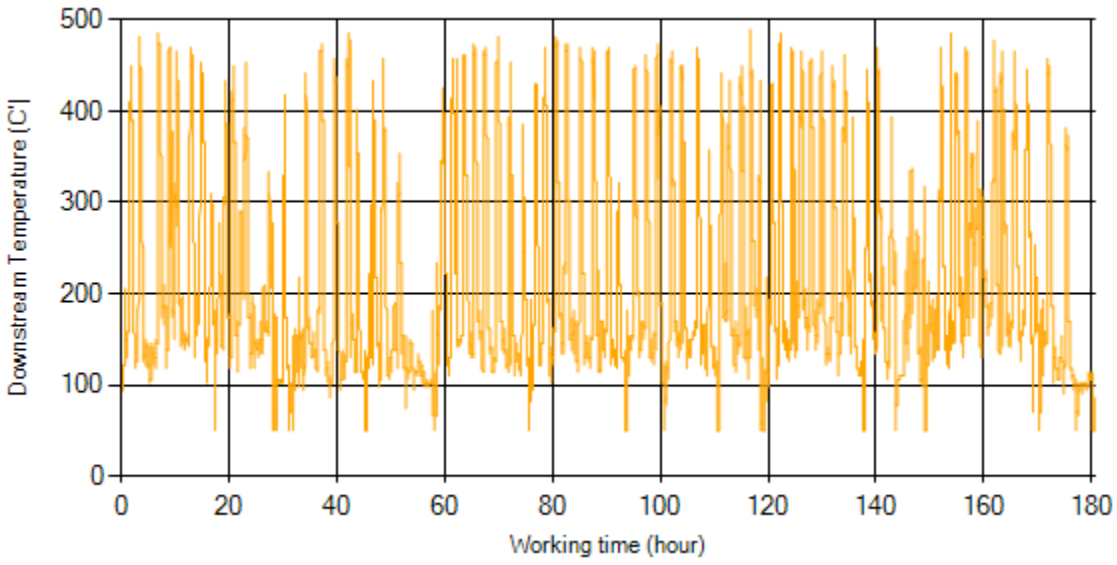


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

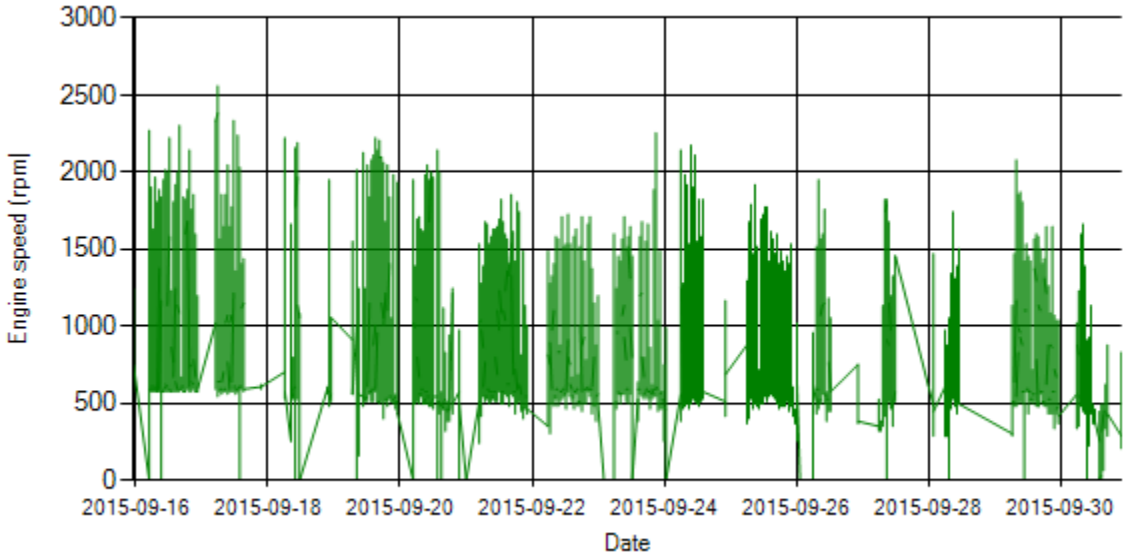


Figure 10- Engine speed distribution over the period

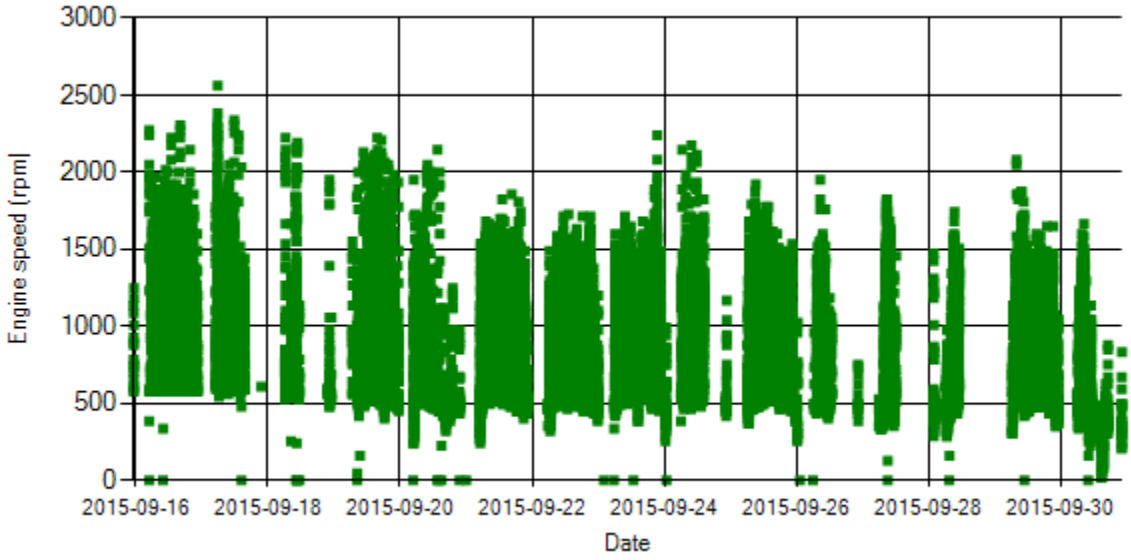


Figure 11- Engine speed diagram for calculating CPK's working days

Notice: RPM sensor had problem during this period.

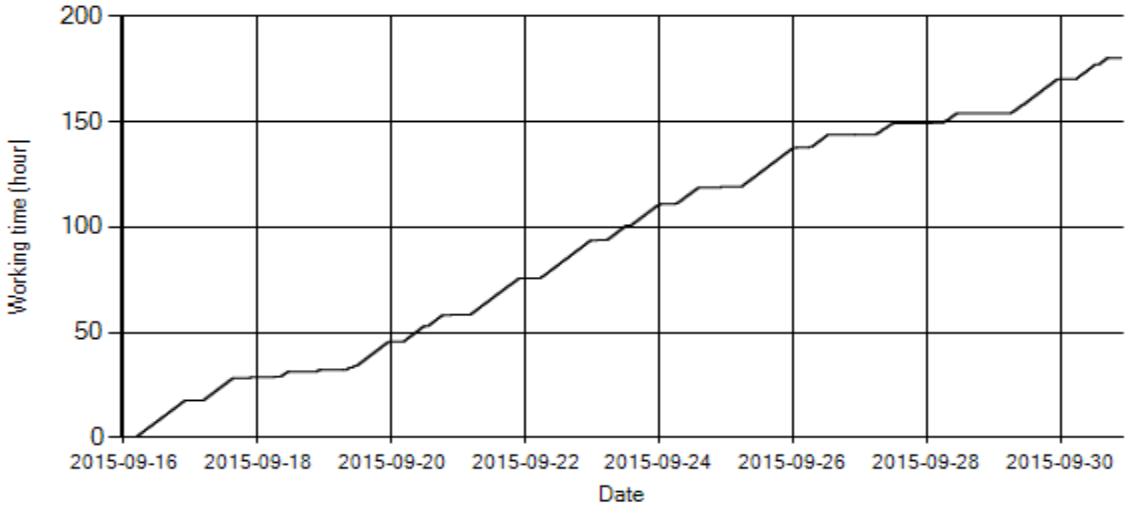


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, data logger was sampling all over the period.

Pressure-Engine Speed diagrams

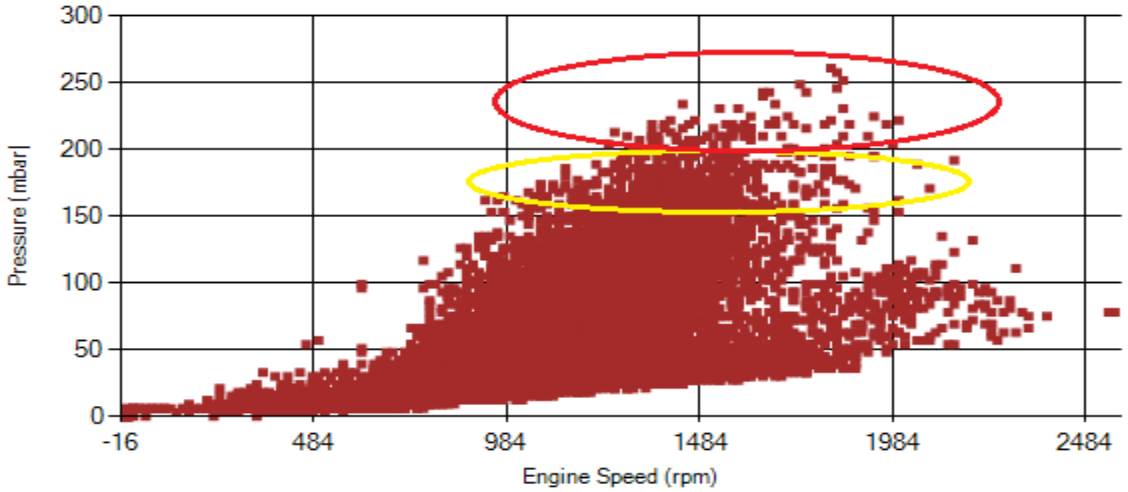


Figure 13- Pressure against engine speed

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

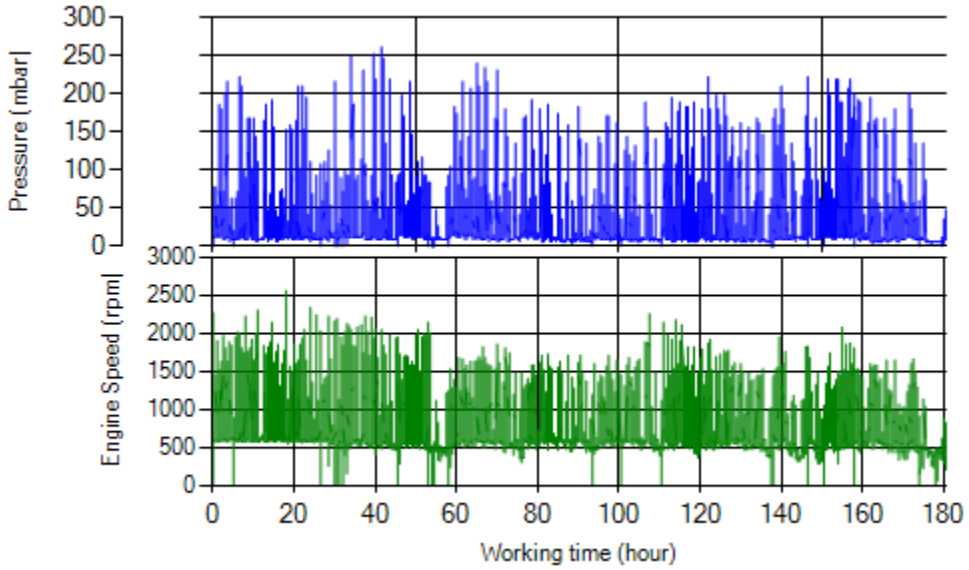


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

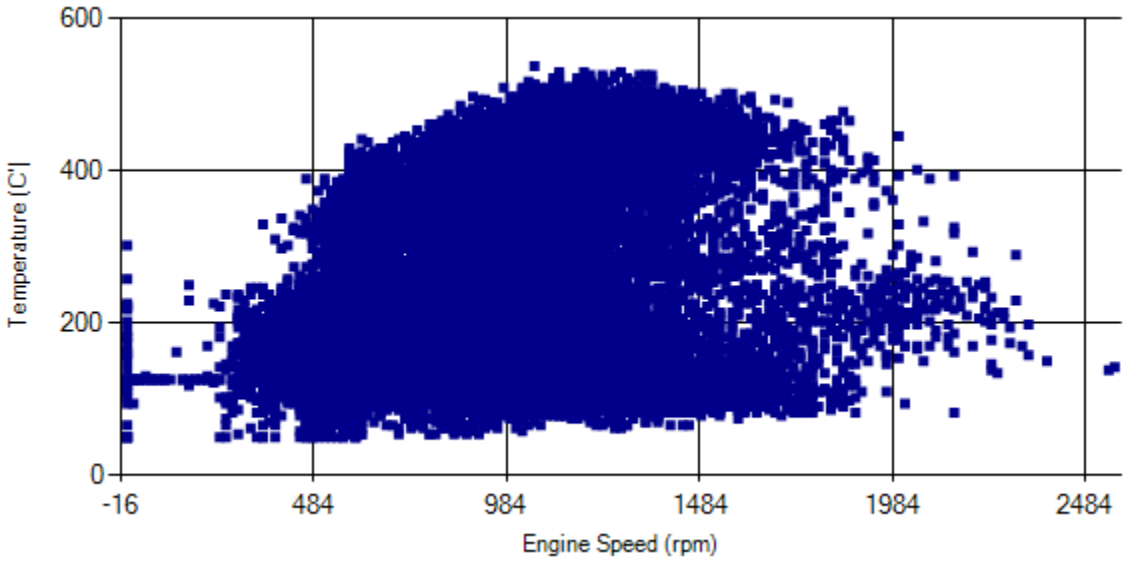


Figure 15- Temperature against engine speed

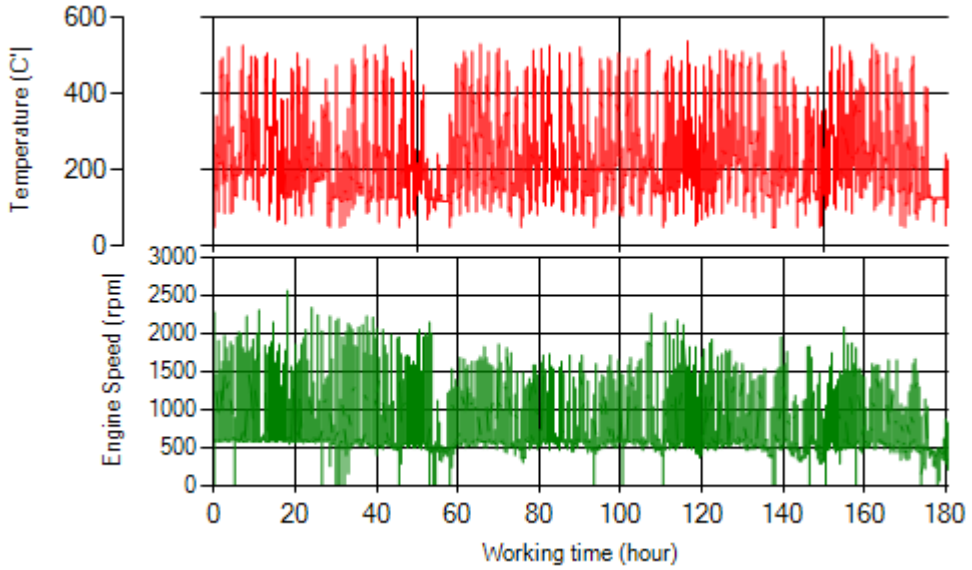


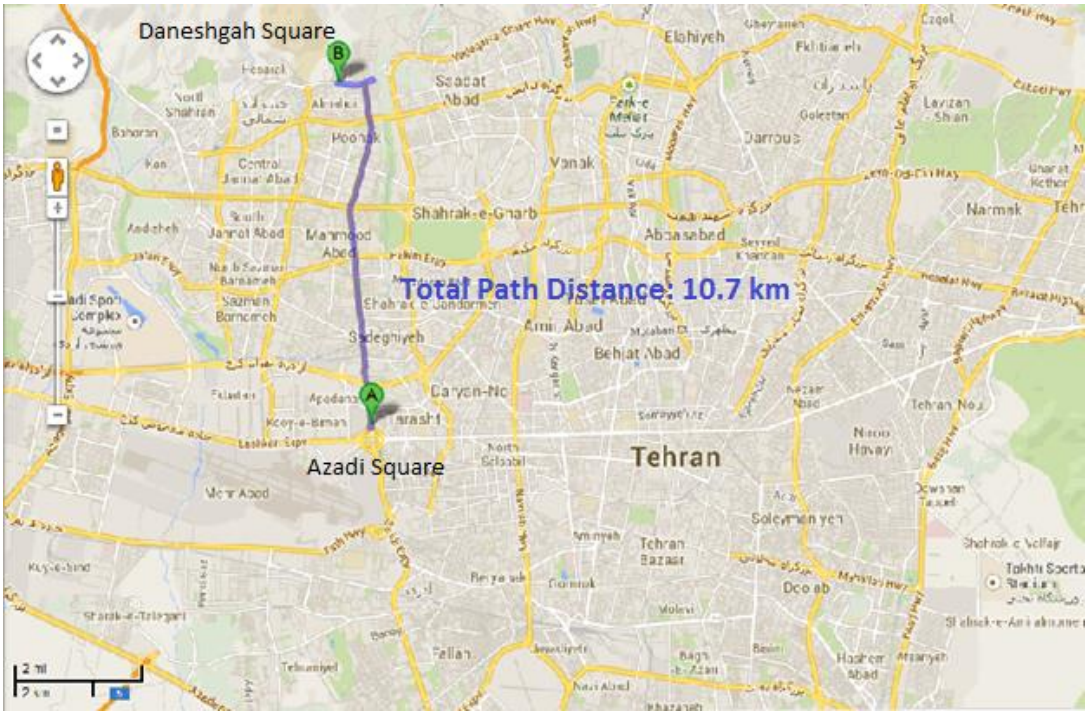
Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, 0. 15% of total working time pressure is above 200 mbar and 1.32% above 150mbar.
- Figure 2 displays flow temperature distribution for DPF's upstream. It can be obviously observed that 10% of total working-time temperature is above 400 ℃ and 16% above 350℃.

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

Vehicle plate number	85182
Bus line	Number 10 (south to north Bus line)
DPF producer company	Tehag_01 (Catalyzed DPF)



ASA Azmoon Sanat Arvin	Document Number: DPF2015092/1 Date: 11/Oct/2015

Overall Information

Table1- Overall Information

Vehicle plate number	85182
CPK data logger number	LN: 001502, DN: 1999
Bus line	Number 10 (south to north Bus line)
Bus Terminals	Azadi square - Daneshgah square
Total path distance	10.7 km
DPF producer company	Tehag_01 (Catalyzed DPF)
Installation date	24/Sep/2015
Report period	24/Sep/2015 – 30/Sep/2015 (seven days)
K value - DPF upstream	1.84 [1/m]
K value – DPF downstream	0.02 [1/m]

Table 2- DPF Maintenance History

Filter maintenance date	Filter have been working from installation date without any cleaning.

Table 3- Fuel and Additive Consumption Information

Bus mileage (from DPF installation date)	666 km
Bus mileage over the period	666 km
Working days over the period	5 days
Stop days	2 days
Data logger working days	5 days
Working hours over the period	78 hours 1 minutes
Average working hours per day (including stop days)	11 hours 9 minutes
Bus average speed	8.54 km/hr
idle speed time to all working time ration	68.65 %
Total Bus fuel consumption over the period	375 lit
Fuel consumption per hour	4.81 lit/hr
Average fuel consumption	0.56 lit/km

Notice: Fuel consumption's data can't be fully reliable due to report's short period.

Temperature, Pressure and Engine Speed Overview

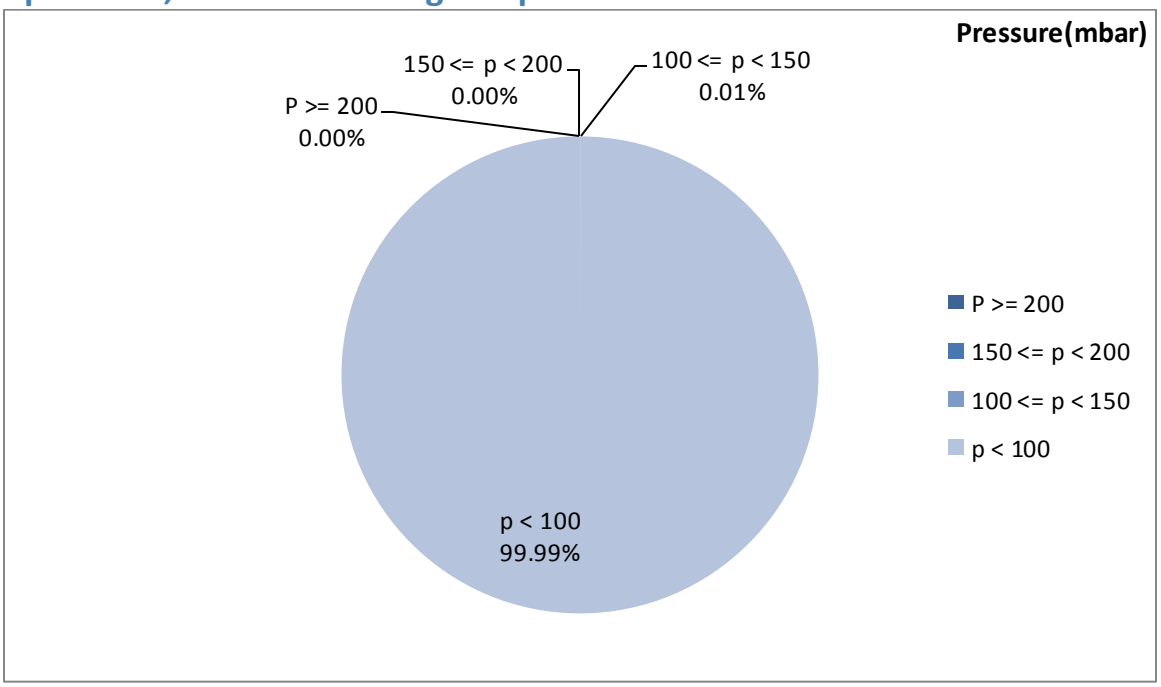


Figure 1- Pressure distribution over the working hours

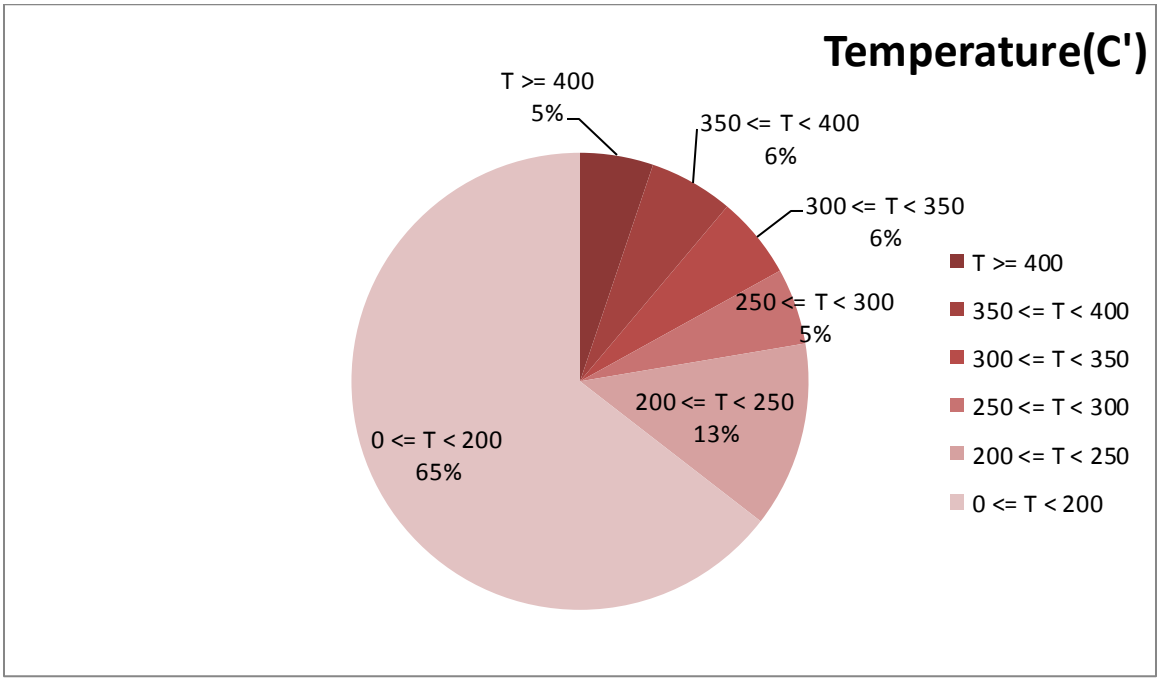


Figure 2-Temperature distribution over the working hours

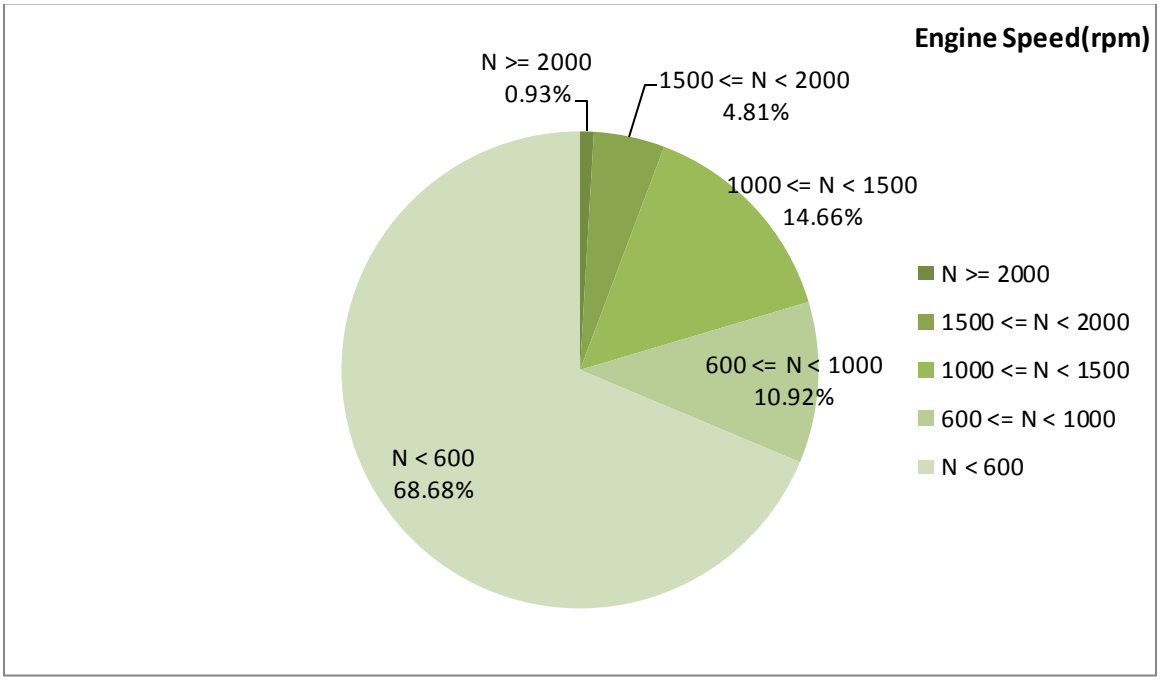


Figure 3- Engine speed distribution over the working hours

Table 4- Mean values

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
201.03	4.79	743

Table 5- Mean values without idling

Mean temperature (C)	Mean pressure(mbar)	Mean engine speed(rpm)
273.43	15.07	1175

Table 6- Max-min values

Max-min temperature(C)	Max-min pressure(mbar)	Max-min engine speed(rpm)
506-50	102-0	4000-256

Detailed Pressure Analysis

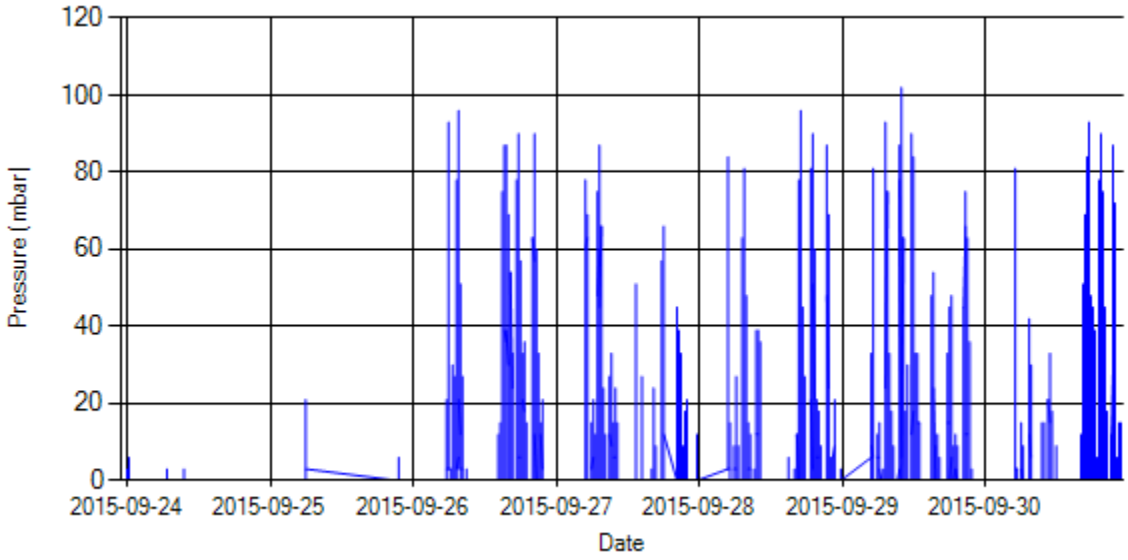


Figure 4- Pressure distribution over the period

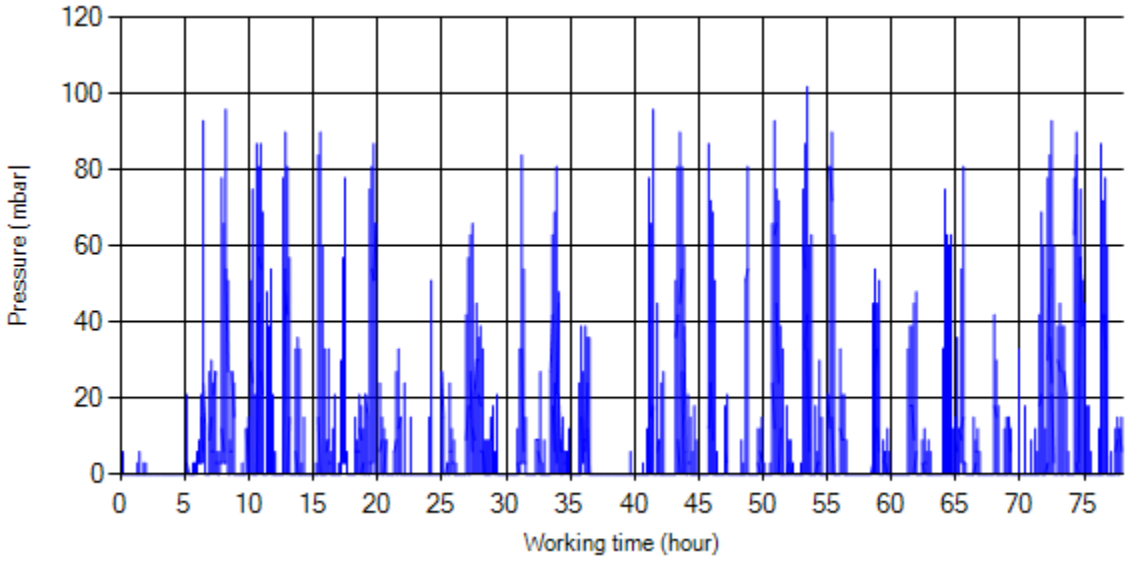


Figure 5- Pressure vs. working hours

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

Detailed Temperature Analysis

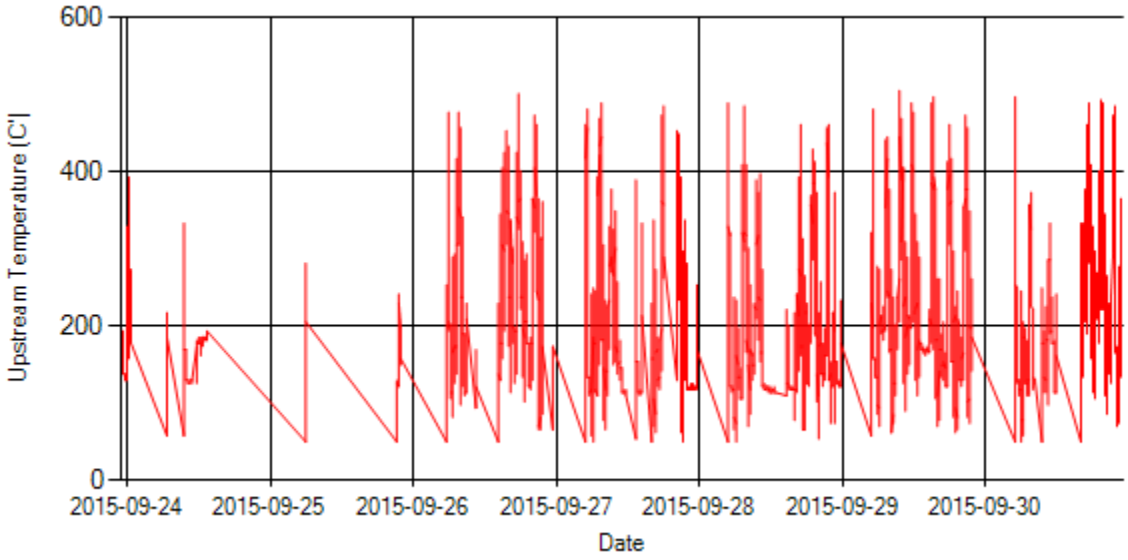


Figure 6- Temperature distribution over the period

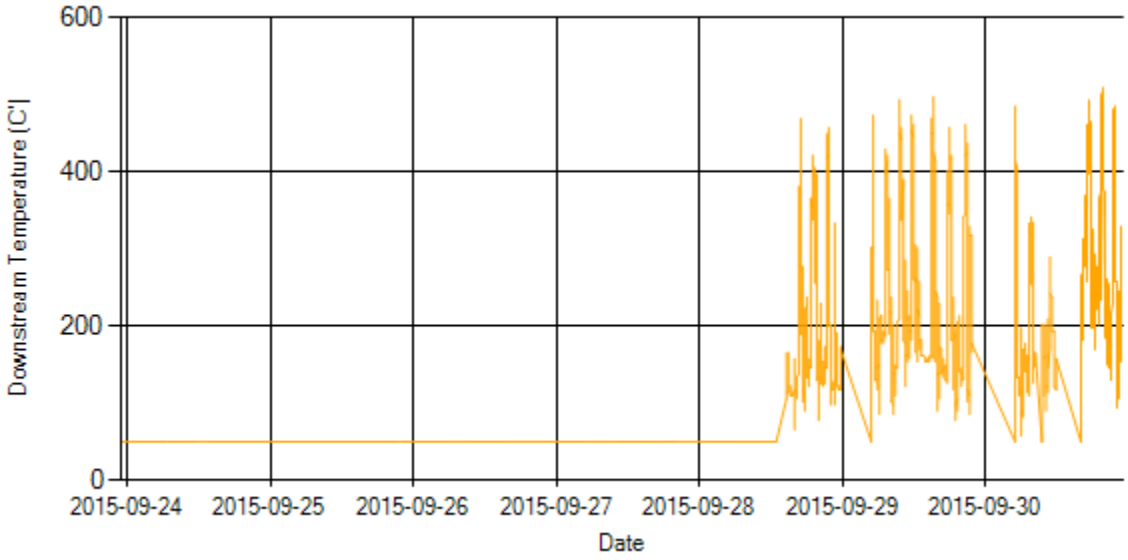


Figure 7- Temperature distribution over the period

Notice: Temp 2 sensor was installed on this system on Sep 29th.

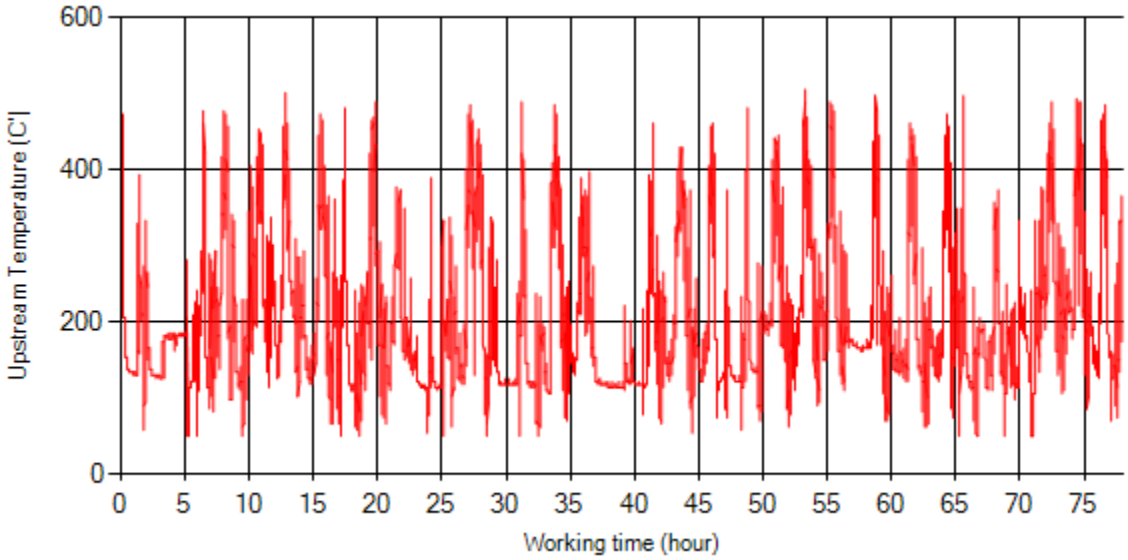


Figure 8- Temperature vs. working hours

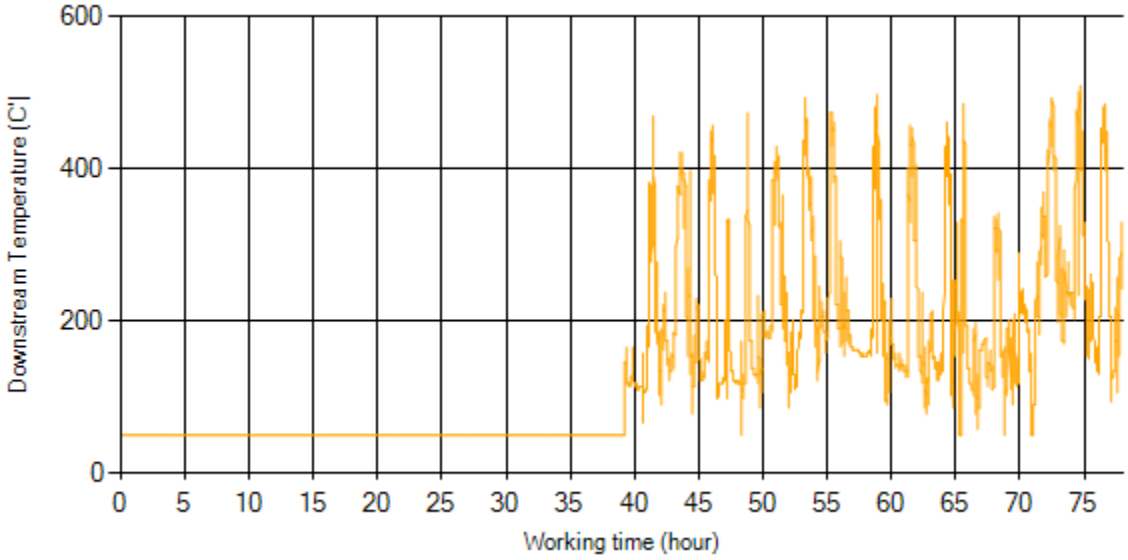


Figure 9- Temperature vs. working hours

Engine Speed Diagrams

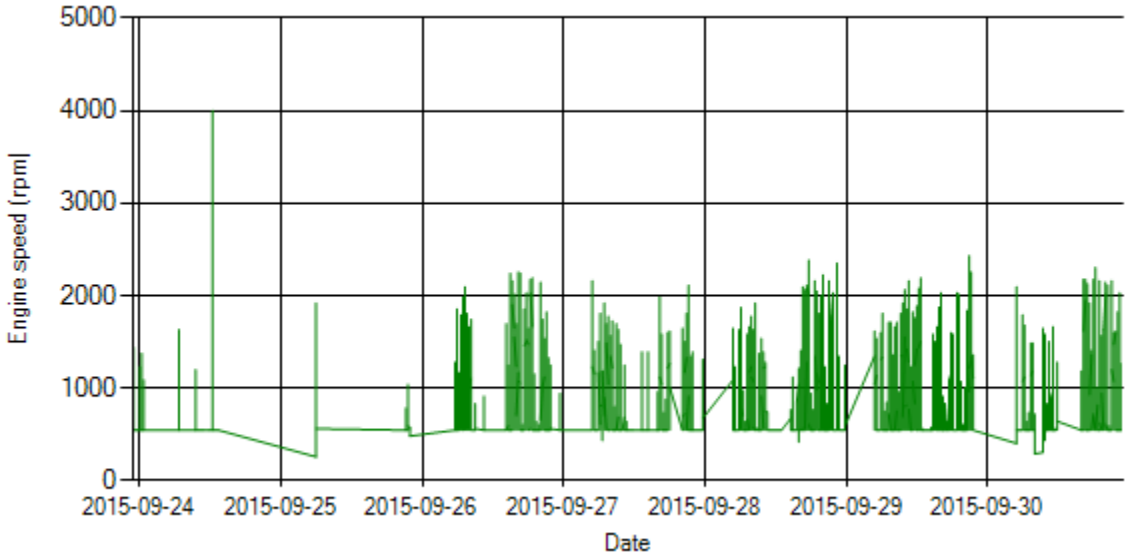


Figure 10- Engine speed distribution over the period

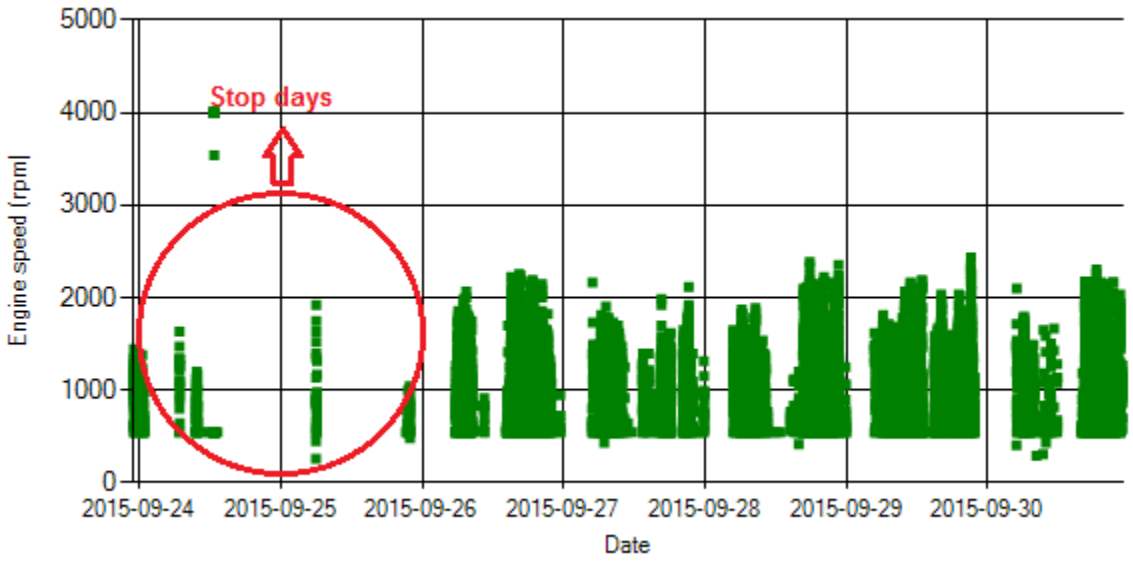


Figure 11- Engine speed diagram for calculating CPK's working days

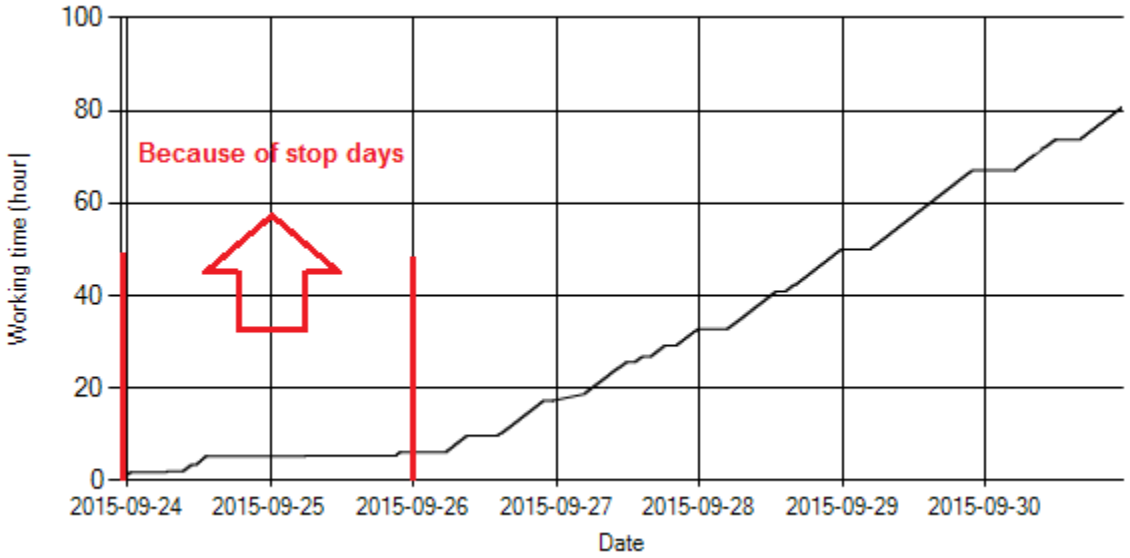


Figure 12- Time diagram for calculating CPK's working days

Notice: Data logger sampling time can be calculated from Figure 12. The lines parallel with Date axis show days without data logger data. As depicted in Figure 12, bus was stopped from 24th to 25th Sep due to DPF installation affairs.

Pressure-Engine Speed diagrams

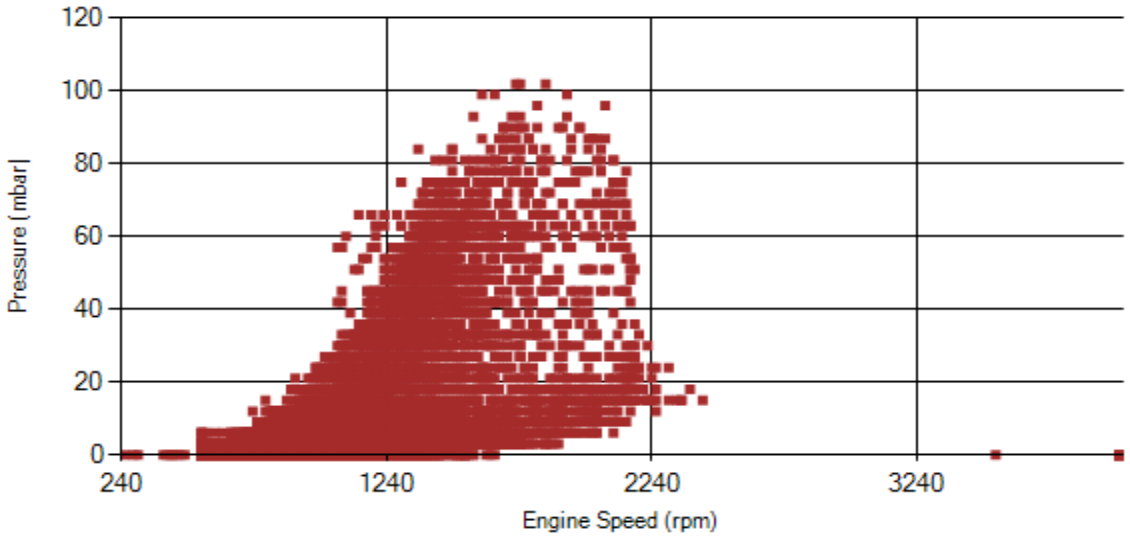


Figure 13- Pressure against engine speed

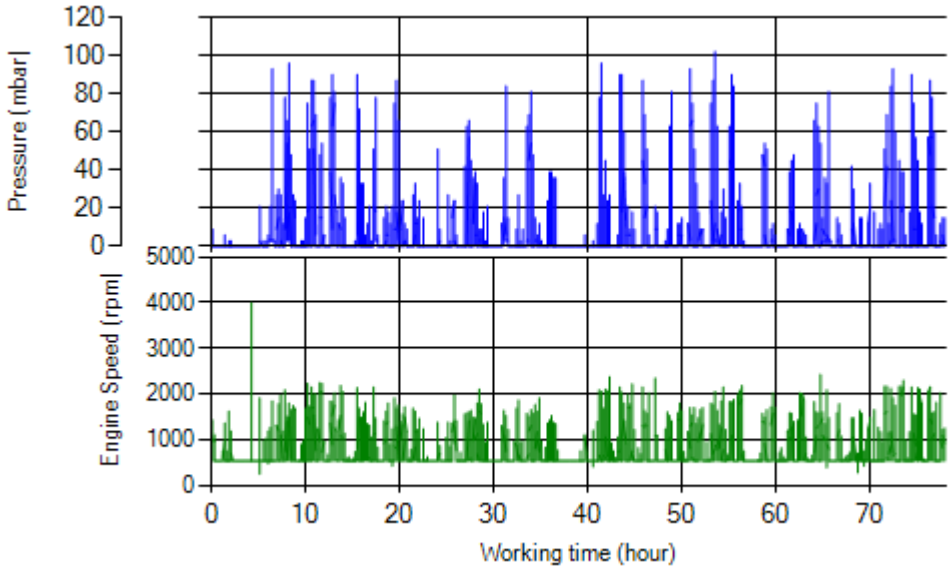


Figure 14- P, N distribution vs. working hours

Temperature-Engine Speed diagrams

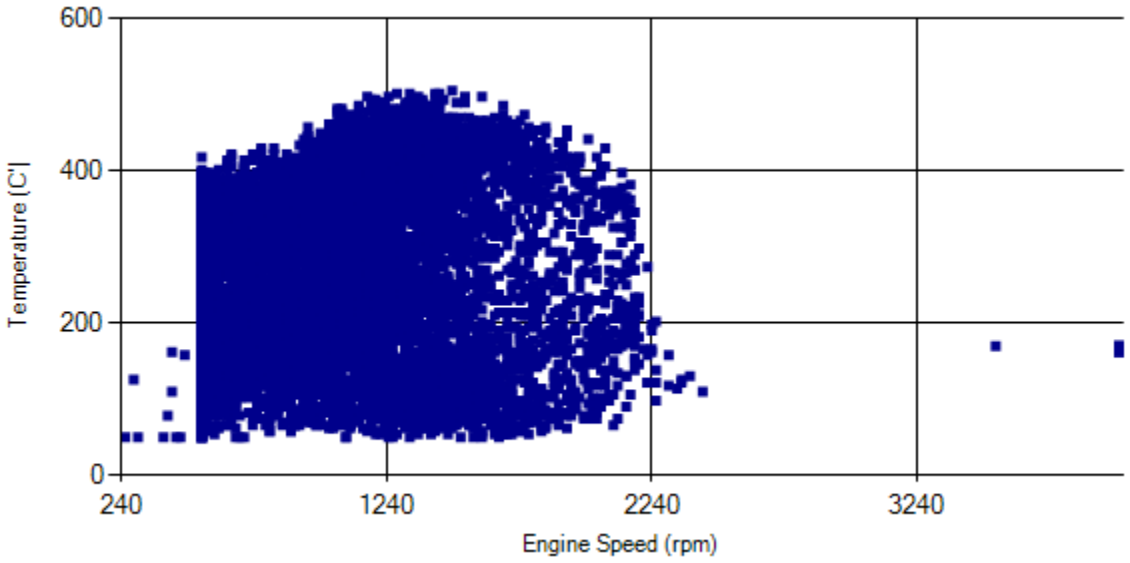


Figure 15- Temperature against engine speed

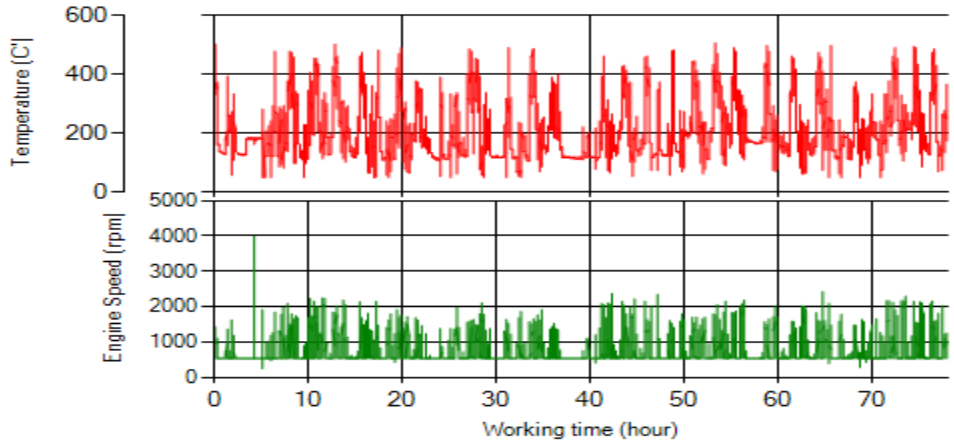


Figure 16- T, N distribution vs. working hours

Filter Operation Analysis

- As depicted in figure 1, only 0.01% of working time pressure was abowe 100 mbar during this period.
- Figure 2, 17 display flow temperature distribution for DPF's upstream. It can be obviously observed that 11% of total working-time temperature is above 350 °C and 22% above 250°C. Considering DPF company recommended operable situation (30% above 250°C), beside high idle working time (69%) during this period, which was because of bus painting and cleaning issues, it could be concluded this DPF operation was fantastic during this period.

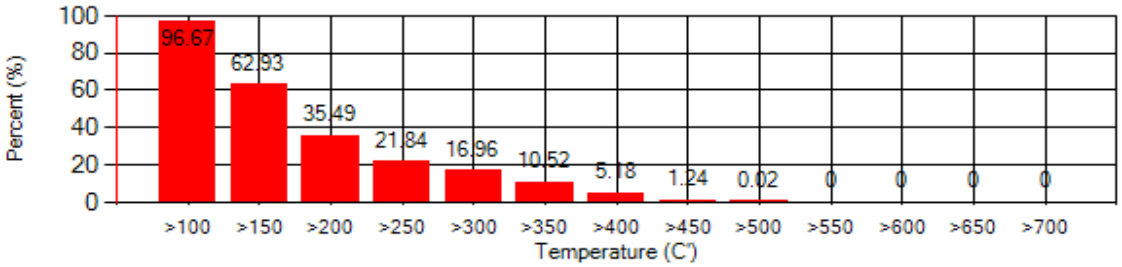


Figure 17. Cumulative diagram of exhaust gas temperature

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

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