1. Research programme of operational tests

Three Mercedes-Benz trucks with the engine power up to 290-320 kW have been planned for the execution of tests to research diesel fuel without additive and with additive. The tests in operation will be effected with winter and summer diesel fuel without additive and the same fuel into which MPG -MEGA – Crumbs^{TM} has been added (1 gram of additive per 100 litres of fuel).

Before the tests the diesel fuels that have been bought from different filling stations will be examined in laboratory and their physicochemical properties will be specified. When it is ascertained that a fuel corresponds to standard, operational tests without catalyst and with catalyst will be effected in trucks.

2. Facilities and measuring instruments of operational tests

The tests were accomplished on three trucks Mercedes-Benz ACTROS 1840LS.

Number-plate	Engine power	Registered	EURO rank
062 ARU	290 kW	01.01.1998	EURO2
302 APZ	290 kW	03.04.2002	EURO3
048 MKB	320 kW	24.04.2007	EURO4

During the tests the outdoor temperature varied -15 ºC ...+20 ºC.

Exhaust gas measurements were performed at idling, medium speed- and maximum speed using gas analyzer QUINTOX KM 9106.

The diesel fuel variants being examined were prepared as the mixture of winter or summer diesel fuel, produced on the basis of petroleum, and additive MPG-MEGA–Crumbs^{TM} where the proportion of additives was 100 litres – 1gram.

The tests of all three Mercedes-Benz trucks were performed in accordance with the EU requirements. Exhaust gas analyzer readings for CO, CO_2, NO, NO_x, SO_2 at idling 600 min^{-1}, medium speed 1100 min^{-1} and maximum speed 2100 min^{-1} were determined on all three trucks.

Fuel consumption was determined at operation without catalyst and with catalyst for the run of 100 km.

Fuel consumption was measured with checked commercial flow meter.The indicator of fuel consumption was compared to the flow meters in trucks and readings of computers.

The exhaust gas measurements were performed with the gas analyzer KH 9106 of the test laboratory.

The physicochemical properties of the diesel fuel in three Mercedes-Benz trucks were determined by laboratorial tests.

Density was measured at the temperature 15ºC using the aerometer method EN ISO 3675.

Cetane index was calculated according to the method EVS- EN ISO 4264.

Lubricity was assessed using HFRR TE 80 unit in accordance with EVS-EN ISO 12156-1:2006.

The concentration of sulfur was determined using TS – 100 ultraviolet fluorescence method EVS-EN ISO 20846:2004.

Flash point was determined in Pensky-Martens closed cup tester according to EVS-EN ISO 2719.

The concentration of ash was determined in muffle furnace according to EVS-EN ISO 6245:2003.

Kinematic viscosity was determined at 40 ºC in Cannon-Fenske Opaque tester according to EVS-EN ISO 3104:2000.

Fuel distillation was carried out in a tester with electric heating in accordance EVS-EN ISO 3405:2000.

The concentration of fat acid methyl esters (FAME) was determined using infrared FT-IR spectrometer model Interspec 2020.

The concentration of hydrocarbon in diesel fuel without catalyst and with catalyst MPG - MEGA – Crumbs^{TM} was measured using the infrared FT-IR spectrometer model Interspec 2020.

3. Analysis of operational test data

The physicochemical properties of winter and summer diesel fuel without catalyst and with catalyst MPG-MEGA–Crumbs™ were determined by laboratorial tests. The results of tests performed by laboratory have been presented in tables 7 and 8.

Table 7. Physicochemical properties of winter diesel fuel with and without MPG-MEGA–Crumbs™.

Property	Unit	Winter diesel fuel		Norm EVS-EN 590		Method
		Without catalyst	With catalyst MPG-MEGA–Crumbs™	**min**	**max**	
Cetane index		52,9	52,9	**46,0**	-	EVS-EN ISO 4264
Density at 15°C	kg/m^3	829,3	829,3	**820**	**845**	EVS-EN ISO 3675
Lubricity, corrected wear scar diameter (wsd 1,4), at 60°C)	μm	369	348	-	**460**	ISO 12156-1
Sulfur content	mg/kg	5,1	4,8	-	**10**	EVS-EN ISO 20846
Flash point, closed cup method	ºC	65,5	66,0	**Above 55**	-	EVS-EN ISO 2719
Ash	% (m/m)	absent	absent	-	**0,01**	EVS-EN ISO 6245
Kinematic viscosity at 40 ºC	mm^2/s	2,61	2,61	**2,00**	**4,50**	EVS-EN ISO 3104
Distillation:						EVS-EN ISO 3405
Distilled at 250 ºC	% (V/V)	42,5	42,0		**<65**	
Distilled at 350 ºC	% (V/V)	94,5	95,0	**85**		
Temperature at 95 volume % distilled	ºC	352	351,5		**360**	
Fat acid methyl ester (FAME) content	% (V/V)	< 1,0	< 1,0	-	**5**	EVS-EN 14078
Copper plate test (3 h; 50 ºC)	class	class 1	class 1	class 1		EVS-EN ISO 2160
Cetane number				51		EN ISO 5165

Table 8. Physicochemical properties of summer diesel fuel with and without MPG-MEGA–Crumbs™.

Property	Unit	Summer diesel fuel		Norm EVS-EN 590		Method
		Without catalyst	With catalyst MPG-MEGA–Crumbs™	**min**	**max**	
Cetane index		53	53	**46,0**	-	EVS-EN ISO 4264
Density at 15°C	kg/m^3	833	833	**820**	**845**	EVS-EN ISO 3675
Lubricity, corrected wear scar diameter (wsd 1,4), at 60°C)	μm	392	350	-	**460**	ISO 12156-1
Sulfur content	mg/kg	5,0	4,8	-	**10**	EVS-EN ISO 20846
Flash point, closed cup method	ºC	69,5	70,0	**above 55**	-	EVS-EN ISO 2719
Ash	% (m/m)	absent	absent	-	**0,01**	EVS-EN ISO 6245
Kinematic viscosity at 40 ºC	mm^2/s	2,82	2,82	**2,00**	**4,50**	EVS-EN ISO 3104
Distillation:						EVS-EN ISO 3405
Distilled at 250 ºC	% (V/V)	36,0	36,0		**<65**	
Distilled at 350 ºC	% (V/V)	94,0	94,5	**85**		
Temperature at 95 volume % distilled	ºC	354,0	351,0		**360**	
Fat acid methyl ester (FAME) content	% (V/V)	< 1,0	< 1,0	-	**5**	EVS-EN 14078
Copper plate test (3 h; 50 ºC)	class	class 1	class 1	class 1		EVS-EN ISO 2160
Cetane number		54	54	51		EN ISO 5165

Laboratory tests (table 7) indicate that when adding the catalyst MPG-MEGA–Crumbs^{TM} into standard winter diesel fuel, lubricity improves by 21 µm, the concentration of sulfur decreased by 0,2 mg/kg, flash point improves by 0,5 ºC , distillate yield at 350 ºC is 0,5 % higher; and this indicates that after the addition of MPG-MEGA–Crumbs^{TM} light fractions appear in the fuel which contribute to better combustion.

Cetane index, density, concentration of ash, kinematic viscosity, concentration of fat acid methyl ester, copper plate test and cetane number remained unchanged.

When adding catalyst MPG-MEGA–Crumbs^{TM} into the diesel fuel conforming to the EU summer standard, lubricity improves by 42 µm, the concentration of sulfur decreased by 0,2 mg/kg , flash point improves by 0,5 ºC, at 350 ºC the evaporation of fuel is by 0,5 % higher and at 360 ºC the evaporation is 3 % higher. This indicates that after the addition of MPG-MEGA–Crumbs^{TM} light fractions appear in the fuel. Cetane index, density, concentration of ash, kinematic viscosity, concentration of fat acid methyl ester, copper plate test and cetane number remained unchanged (Table 8).

When comparing the IP spectrums of source diesel fuels with catalyst and without catalyst (Figure 3 and 4), we can see that the addition of catalyst does not influence the chemical composition of fuel. The composition and intensity of functional groups in the same conditions is the same. As the amount of catalyst is small, its composition in these conditions is not differentiated from the main spectrum, except in the waveband of oxygenates (3300-3600) sm^{-1} where the growth of intensity of a particular strip can be observed when compared to the diesel fuel spectrum without catalyst.

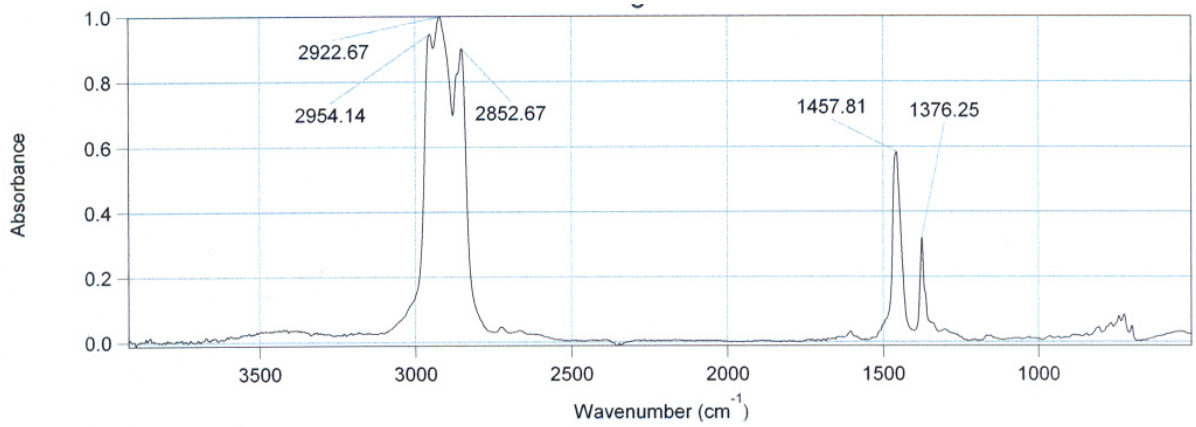

Figure 3. Spectrum of diesel fuel conforming to the EU norms

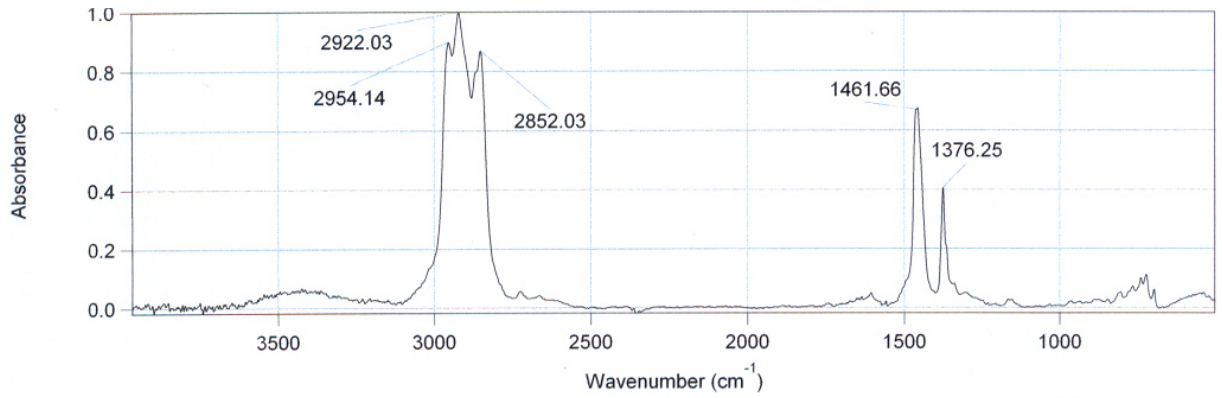

Figure 4. Spectrum of diesel fuel conforming to the EU norms, catalyst MPG-MEGA–Crumbs™ added

The composition of exhaust gas in three Mercedes-Benz trucks was determined at idling 600 min^{-1}, medium speed 1100 min^{-1} and maximum speed 2100 min^{-1} (Tables 9,10,11).

In case of truck Mercedes-Benz reg. no 048 MKB (Table 9) after the addition of the catalyst MPG-MEGA–Crumbs™ into diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased at idling 600 min^{-1} by 66 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 66,6 %, the concentration of nitric oxides (NO_x) decreased by 62,5 % and toxicity index improved by 65,2 %.

At medium speed 1100 min^{-1} on the same truck Mercedes-Benz after the addition of the catalyst the concentration of carbon oxide (CO) in exhaust gas decreased 49,5 %, carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 59,8 %, the concentration of nitric oxides(NO_x) decreased by 59,8 % and toxicity index improved by 50,3 %.

After the addition of the catalyst into diesel fuel at maximum speed 2100 min^{-1} the concentration of carbon oxide (CO) in exhaust gas decreased by 28,5 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) in exhaust gas decreased by 30,8 %, the concentration of nitric oxides (NO_x) decreased by 30 % and toxicity index improved by 33,1 %.

The results of exhaust gas in truck Mercedes-Benz reg. no 048 MKB are presented in Figures 5, 6, 7 and 8.

Table 9. Results of tests with the diesel fuel without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} on truck Mercedes-Benz reg. no 048 MKB

Property	Diesel fuel without catalyst			Diesel fuel with catalyst MPG -MEGA – Crumbs^{TM}											
Rotational speed, min^{-1}	600	1100	2100	600				1100				2100			
				1 test	2 test	Ave-rage	%	1 test	2 test	Ave-rage	%	1 test	2 test	Ave-rage	%
Carbon dioxide (CO_2), %	1,6	2,0	2,3	1,6	1,6	1,6		2,0	2,0	2,0		2,3	2,2	2,3	
Carbon oxide (CO), ppm	146	227	168	47	52	50	66	129	100	115	49,5	122	118	120	28,5
Nitric oxide (NO), ppm	488	375	343	191	134	163	66,6	157	145	151	59,8	132	343	237	30,8
Nitric oxides (NO_x), ppm	454	393	360	200	140	170	62,5	164	152	158	59,8	144	359	252	30,0
Toxicity index, CO/CO_2*100	0,91	1,12	0,73	0,3	0,3	0,3	65,2	0,64	0,49	0,56	50,3	0,53	0,53	0,53	33,1

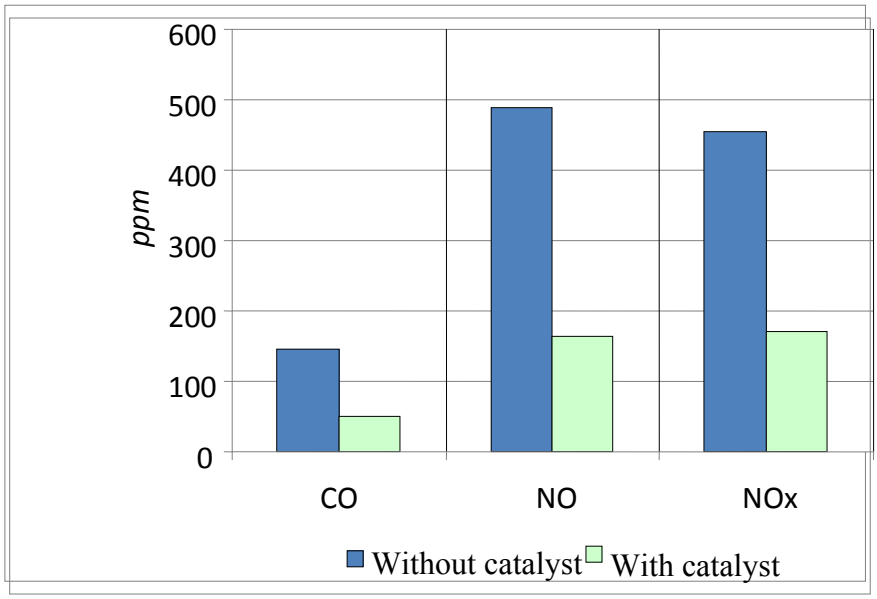

Figure 5. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 048 MKB at idling 600 min^{-1}

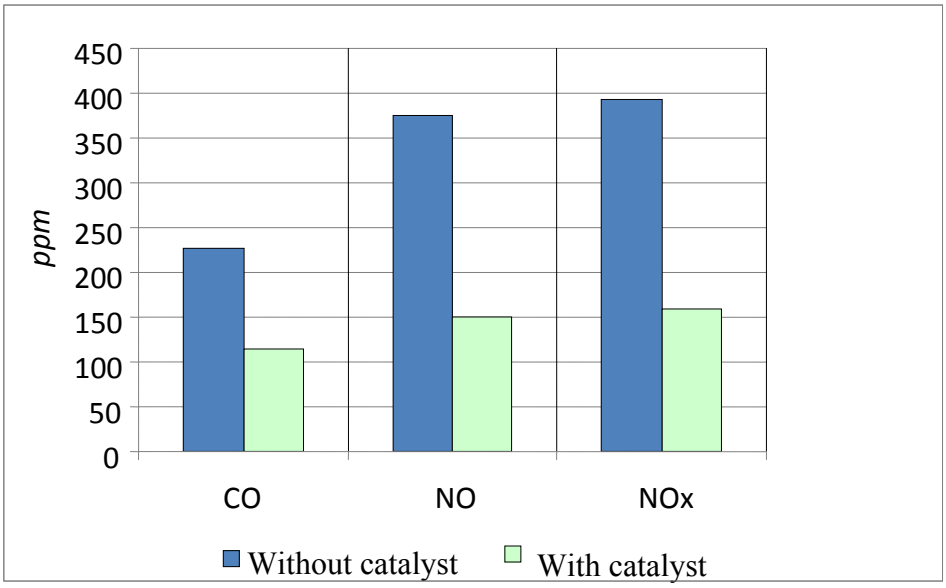

Figure 6. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 048 MKB at medium speed 1100 min^{-1}

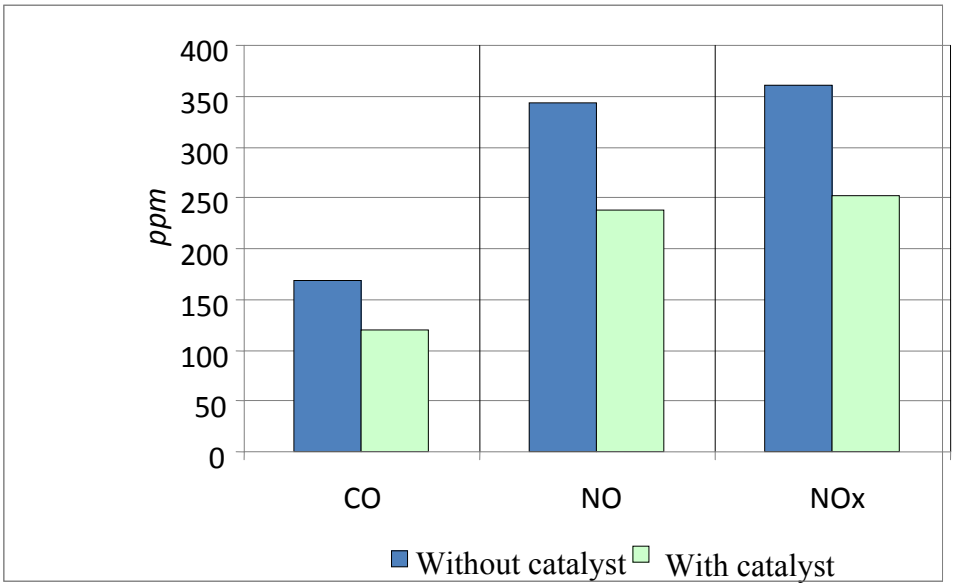

Figure 7. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 048 MKB at maximum speed 2100 min^{-1}

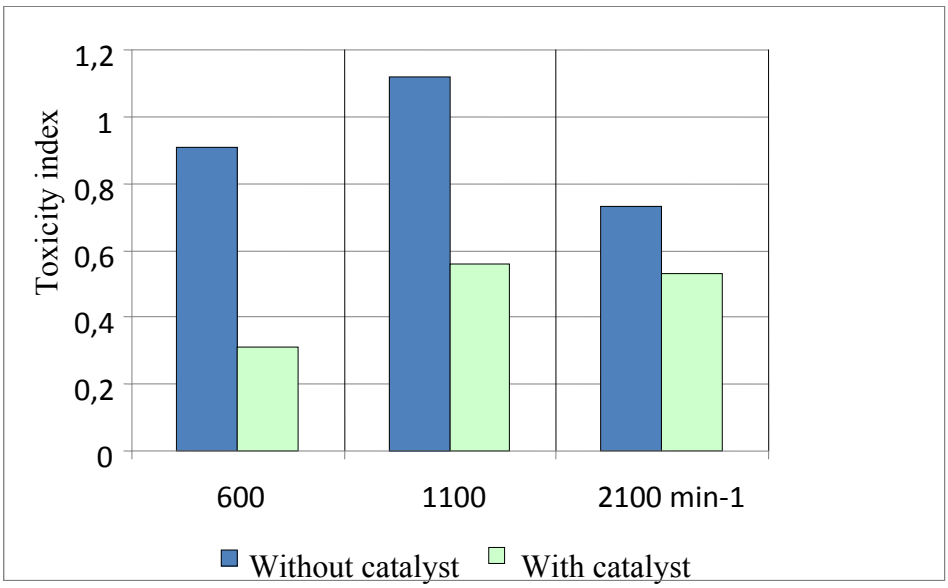

Figure 8. Exhaust gas toxicity index without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 048 MKB at idling, medium speed and maximum speed

In case of truck Mercedes-Benz reg. no 062 ARU (Table 10) after the addition of the catalyst MPG-MEGA–Crumbs^{TM} into diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased at idling 600 min^{-1} by 51,3 % , the concentration of carbon dioxide (CO_2)

decreased by 10,4 %, the concentration of nitric oxide (NO) decreased by 67,2 %, the concentration of nitric oxides (NO_x) decreased by 67,2 % and toxicity index improved by 44,6 %.

At medium speed 1100 min^{-1} on the same truck after the addition of the catalyst the concentration of carbon oxide (CO) in exhaust gas decreased 55,9 %, the concentration of carbon dioxide (CO_2) decreased by 2,4 %, the concentration of nitric oxide (NO) decreased by 40,9 %, the concentration of nitric oxides 41,1 % and toxicity index improved by 55 %.

At maximum speed 2100 min^{-1} the concentration of carbon oxide (CO) in exhaust gas decreased by 26,3 %, the concentration of carbon dioxide (CO_2) decreased by 2%, the concentration of nitric oxide (NO) in exhaust gas decreased by 38,9 %, the concentration of nitric oxides (NO_x) decreased by 38,8 % and toxicity index improved by 27,6 %.

The results of exhaust gas in truck Mercedes-Benz reg. no 062 ARU are presented in Figures 9, 10, 11 and 12.

Table 10. Results of tests with the diesel fuel without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} on truck Mercedes-Benz reg. no 062 ARU

Property	Diesel fuel without catalyst			Diesel fuel with catalyst MPG -MEGA – Crumbs^{TM}											
Rotational speed, min^{-1}	600	1100	2100	600				1100				2100			
				1 test	2 test	Ave-rage	%	1 test	2 test	Ave-rage	%	1 test	2 test	Ave-rage	%
Carbon dioxide (CO_2), %	1,5	2,1	2,5	1,3	1,5	1,4	10,4	2.1	2	2.1	2,4	2,5	2,6	2,6	2
Carbon oxide (CO), ppm	86	231	203	42	42	42	51,3	120	84	102	55,9	176	123	150	26,3
Nitric oxide (NO), ppm	344	383	297	127	99	113	67,2	255	198	226	40,9	265	98	182	38,9
Nitric oxides (NO_x), ppm	361	402	311	133	107	118	67,2	267	206	237	41,1	278	102	190	38,8
Toxicity index, CO/CO_2*100	0,52	1,12	0,92	0,57	0,28	0,3	44,6	0,57	0,42	0,5	55,0	0,7	0,48	0,6	27,6

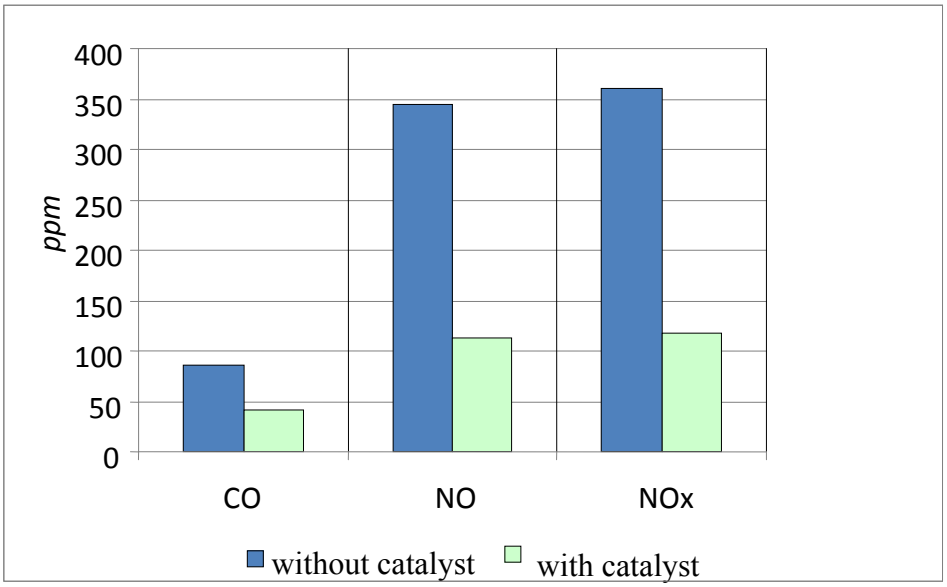

Figure 9. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 062 ARU at idling 600 min^{-1}

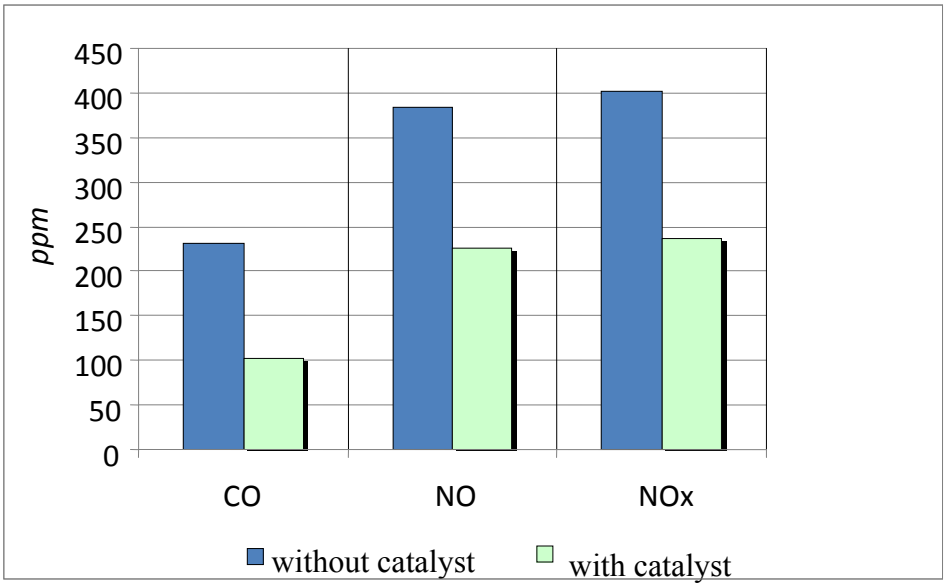

Figure 10. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 062 ARU at medium speed 1100 min^{-1}

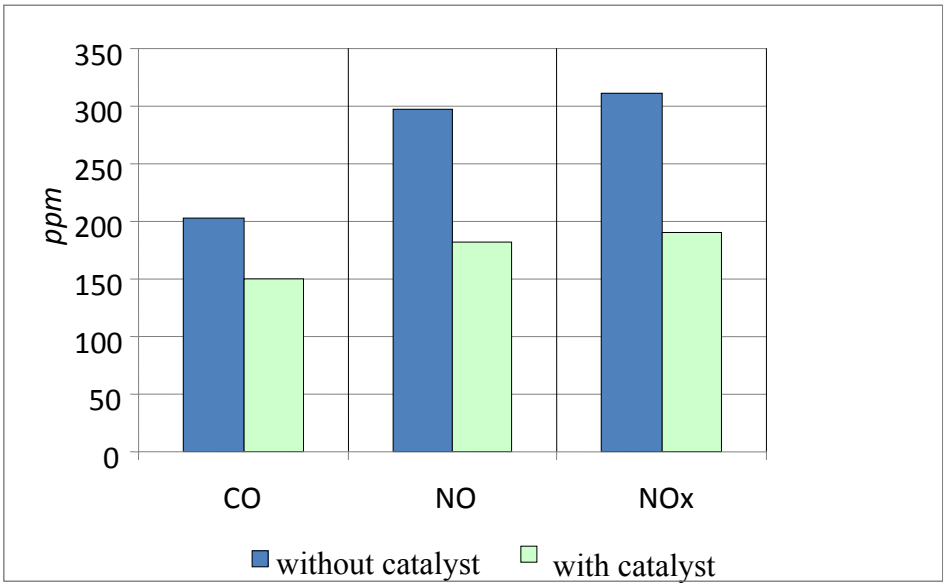

Figure 11. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs™ in truck Mercedes-Benz reg. no 062 ARU at maximum speed 2100 min^{-1}

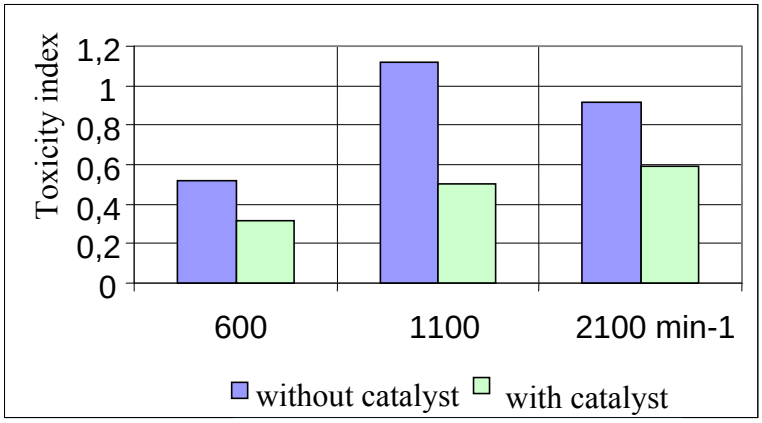

Figure 12. Exhaust gas toxicity index without catalyst and with catalyst MPG -MEGA – Crumbs™ in truck Mercedes-Benz reg. no 062 ARU at idling, medium speed and maximum speed

In truck Mercedes-Benz reg no 302 APZ (Table 11) after the addition of the catalyst MPG-MEGA–Crumbs™ into diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased at idling 600 min^{-1} by 11,7 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 4 %, the concentration of nitric oxides (NO_x) decreased by 3,2 % and toxicity index improved by 13,3 %.

At medium speed 1100 min^{-1} on the same truck after the addition of the catalyst the concentration of carbon oxide (CO) in exhaust gas decreased 22,2 %, %, carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 26,4 %, the concentration of nitric oxides(NO_x) decreased by 19,8 % and toxicity index improved 19,1 %.

At maximum speed 2100 min^{-1} , after the addition of the catalyst into diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased 20,2 %, carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 13,9 %, the concentration of nitric oxides(NO_x) decreased by 14,2 % % and toxicity index improved by 21,6 %.

decreased

The results of exhaust gas in truck Mercedes-Benz reg. no 302 APZ are presented in Figures 13, 14, 15 and 16.

Table 11. Results of tests with the diesel fuel without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} on truck Mercedes-Benz reg. no 302 APZ

Property	Diesel fuel without catalyst			Diesel fuel with catalyst MPG -MEGA – Crumbs^{TM}					
Rotational speed, min^{-1}	600	1100	2100	600	%	1100	%	2100	%
Carbon dioxide (CO_2), %	1,1	1,8	2,3	1,1		1,8		2,3	
Carbon oxide (CO), ppm	58	202	212	51	11,7	157	22,2	169	20,2
Nitric oxide (NO), ppm	55	109	89	53	4,0	80	26,4	77	13,9
Nitric oxides (NO_x), ppm	57	104	93	55	3,2	83	19,8	80	14,2
Toxicity index, CO/CO_2*100	0,52	1,12	0,92	0,46	13,3	0,91	19,1	0,72	21,6

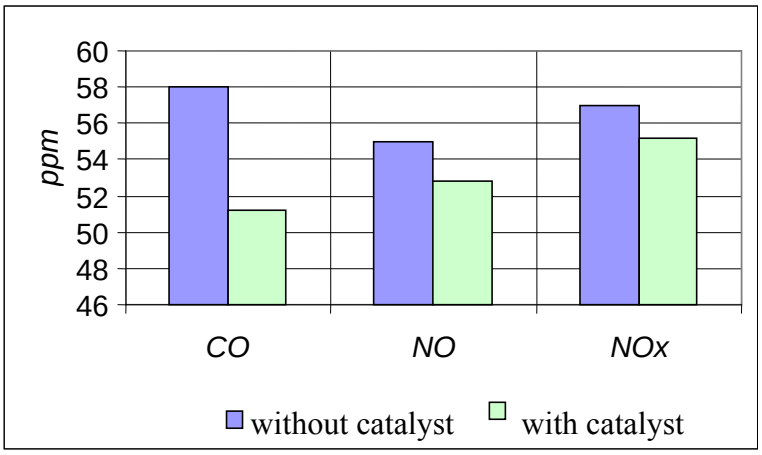

Figure 13. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 302 APZ at idling 600 min^{-1}

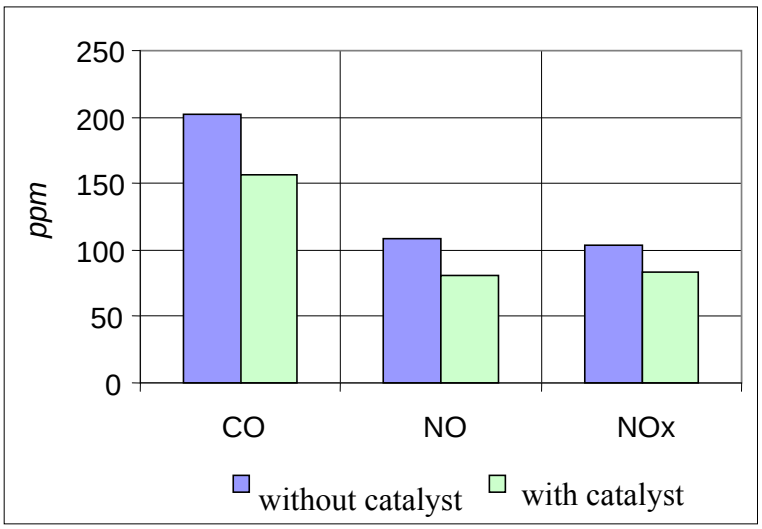

Figure 14. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 302 APZ at medium speed 1100 min^{-1}

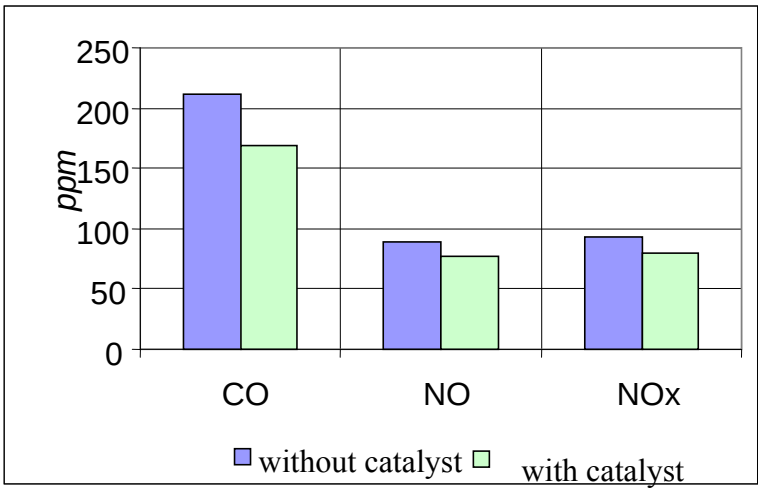

Figure 15. Composition of exhaust gas without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 302 APZ at maximum speed 2100 min^{-1}

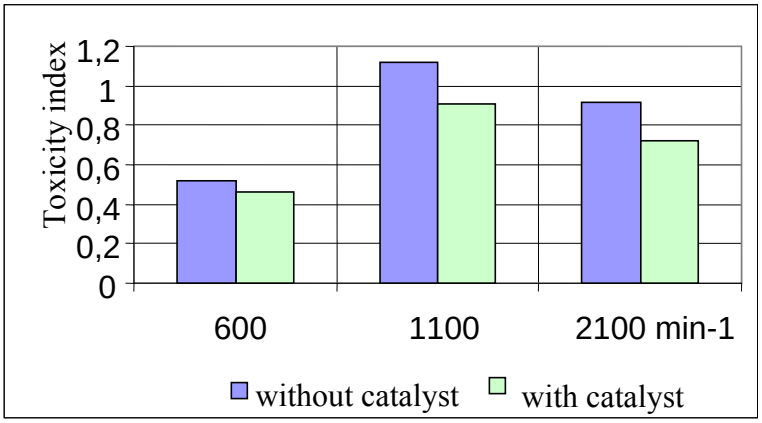

Figure 16. Exhaust gas toxicity index without catalyst and with catalyst MPG -MEGA – Crumbs^{TM} in truck Mercedes-Benz reg. no 302 APZ at idling, medium speed and maximum speed

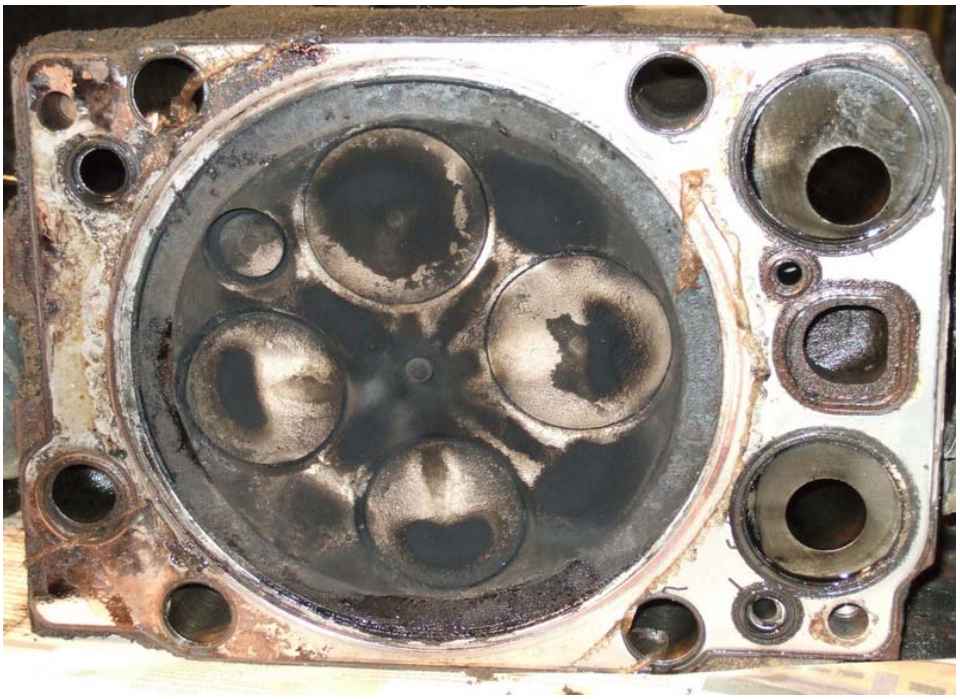

Photo 5. Mercedes-Benz truck reg. no 048 MKB cylinder cover at operation with diesel fuel without catalyst.

We can see from Photo 5 that there is a layer of forge scale on the input and output valves as well as the cylinder cover.

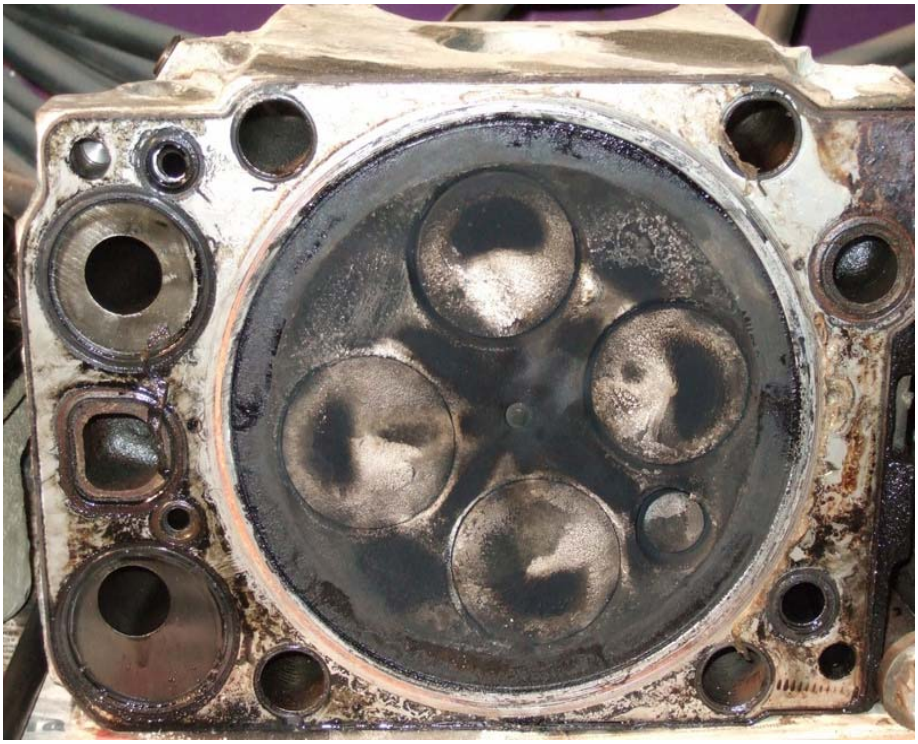

Photo 6. Cylinder cover of Mercedes-Benz reg. no 048 MKB at operation with diesel fuel with catalyst MPG -MEGA – Crumbs^{TM}.

After the operation of 2 months the forge scale on input and output valves and partially on the cylinder cover has burnt up. It refers to the more complete combustion of fuel. Thus the catalyst

contributes to combustion and the operation of engine improves and the working life of engine prolongs as well.

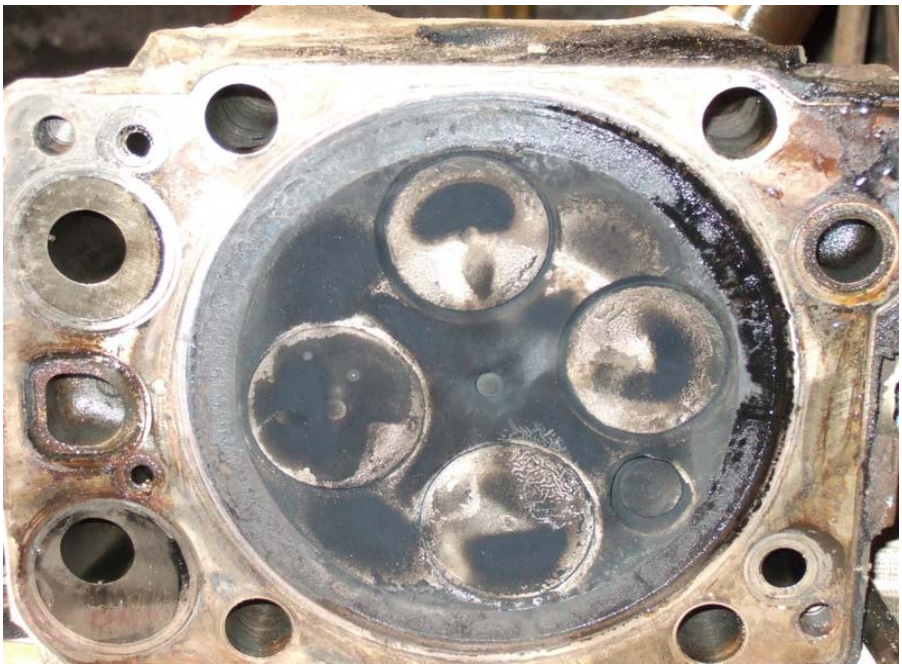

Photo 7. . Mercedes-Benz truck reg. no 062 ARU cylinder cover at operation with diesel fuel without catalyst.

We can see from Photo 7 that there is a layer of forge scale on the input and output valves as well as the cylinder cover.

Photo 8. Cylinder cover of Mercedes-Benz reg. no 062 ARU at operation with diesel fuel with catalyst MPG -MEGA – Crumbs^{TM}.

After the operation of 2 months the forge scale on input and output valves and partially on the cylinder cover has burnt up. It refers to the more complete combustion of fuel.

Table 12. Fuel consumption in truck Mercedes-Benz at operation with diesel fuel without catalyst and with catalyst MPG -MEGA – Crumbs™

Property	Unit	reg. no 048 MKB			reg. no 062 ARU			reg. no 302 APZ		
		diesel fuel without catalyst	diesel fuel with MPG MEGA Crumbs™	%	diesel fuel without catalyst	diesel fuel with MPG MEGA Crumbs™	%	diesel fuel without catalyst	diesel fuel with MPG MEGA Crumbs™	%
Special consumption of fuel	l/km	0,65	0,54	16,9	0,57	0,5	12,3	0,59	0,51	13,6
Engine power	kW	320			290			290		

At operation with diesel fuel with catalyst the special consumption of fuel decreased in all three trucks. Thus, the catalyst contributes to combustion of fuel. Upon better combustion the engine power increased and the engine consumed less fuel (Table 12).

Table 13. Exhaust gas properties received as the result of tests with catalyst MPG -MEGA – Crumbs™.

	Document	Carbon oxide (CO) norm, g/km	Carbon oxide (CO) test result, g/km			Nitrogen oxides (NO_x) norm, g/km	Nitrogen oxides (NO_x) test result, g/km		
			048 MKB	062 ARU	302 APZ		048 MKB	062 ARU	302 APZ
Euro 1	Directive 91/441-1992	2,72				-			
Euro 2	Directive 94/12-1996	1				-			
Euro 3	Directive 98/69A-2000	0,64				0,5			
Euro 4	Directive 98/69B-2005	0,5				0,25			
Euro 5	715/2007-2011	0,5				0,18			
Euro 6	715/2007-2015	0,5	0,35	0,44	0,49	0,08	0,078	0,06	0,03

At operation with the diesel fuel into which catalyst MPG-MEGA-–Crumbs™ had been earlier added, the exhaust gas properties of all three Mercedes-Benz trucks conformed to Euro 6 norms 715/2007-2015 (Table 13).

Summary

As the result of laboratory tests it was ascertained that at operation with summer diesel fuel with catalyst MPG - BOOST™, 0,295 ml of catalyst per 1 litre of diesel fuel, the cetane number of diesel fuel improved by 0,7 units and cetane index by 0,1 units, flashpoint decreased by one unit and density at the temperature 15 ºC remained the same.

When adding 0,295 ml of catalyst MPG-BOOST™ OR 0,01 g of MPG-Caps™ into 1 litre of winter diesel fuel, cetane number improved in case of both catalysts by 0,3 units.

Flashpoint and density upon the addition of the same amount of catalyst remained unchanged (Table 4).

When catalyst MPG - BOOST™ was added into the summer diesel fuel, lubricity improved by 41 μm, thus the wear of moving parts in fuel feed equipment and engine decreased. The working life of the engine and fuel feed equipment in diesel automobiles becomes longer. When the lubricity is better, the slide of moving parts improves and the noise of engine decreases. When catalyst MPG - BOOST™ was added into the summer diesel fuel, kinematic viscosity remained unchanged. When catalyst MPG - BOOST was added into the winter diesel fuel, kinematic viscosity at 40 ºC decreased 0,07 mm^2/s, and when catalyst MPG-Caps was added, kinematic viscosity at 40 ºC decreased 0,21 mm^2/s.

Tests with engine on a bench showed that at work with summer diesel fuel after the addition of catalyst MPG - BOOST™ the engine power increased by 8 % and at work with winter diesel fuel after the addition of catalyst MPG-BOOST the engine power increased by 12 %. At work with the summer diesel fuel after the addition of catalyst MPG - BOOST™ the special consumption of fuel decreased by 9,1 % and at work with the winter diesel fuel after the addition of catalyst MPG - BOOST™ the special consumption of fuel decreased 9,2 %.

At work with the summer diesel fuel after the addition of catalyst MPG - BOOST™ the concentration of carbon oxide (CO) in exhaust gas decreased by 7 %, the concentration of nitric oxide (NO) in exhaust gas decreased by 6 % and the concentration of nitric oxides (NO_x) in exhaust gas decreased by 7 %. The concentration of carbon dioxide (CO_2) remained unchanged. After the addition of catalyst the efficiency of engine combustion improved by 3 % and the toxicity index of exhaust gas improved by 7 %.

When testing the winter diesel fuel on the bench after the addition of catalyst MPG - BOOST™ , the concentration of carbon oxide (CO) in exhaust gas decreased by 28 %, the concentration of nitric oxide (NO) and nitric oxides (NO_x) decreased by 6 %. The concentration of carbon dioxide (CO_2) remained unchanged. Combustion efficiency improved by 4 % and the toxicity index of exhaust gas improved by 28 %.

When adding catalyst MPG-MEGA–Crumbs™ into the winter diesel fuel of the Mercedes-Benz trucks in operation, lubricity improved by 21 μm, the concentration of sulfur decreased by 0,2 mg/kg, flashpoint in closed cup improved by 0,5 ºC. At the temperature 350 ºC 0,5 % more fuel was distilled. When adding catalyst MPG-MEGA–Crumbs™ into the summer diesel fuel of the Mercedes-Benz trucks in operation, lubricity improved by 42 μm, the concentration of sulfur decreased by 0,2 mg/kg , flashpoint in closed cup rose by 0,5 ºC. At the temperature 350 ºC 0,5% more fuel and at 360 ºC 3 % more fuel evaporated.

When adding catalyst MPG-MEGA–Crumbs™ into the diesel fuel of the truck Mercedes-Benz reg. no 048 MKB at idling 600 min^{-1}, the concentration of carbon oxide (CO) in exhaust gas decreased by 66 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 66,6 %, the concentration of nitric oxides (NO_x) decreased by 62,5 % and toxicity index improved by 65,2 %.

At medium speed 1100 min^{-1} on the same truck Mercedes-Benz after the addition of the catalyst the concentration of carbon oxide (CO) in exhaust gas decreased by 49,5 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 59,8 %, the concentration of nitric oxides (NO_x) decreased by 59,8 % and toxicity index improved by 50,3 %.

At maximum speed 2100 min^{-1} after the addition of the catalyst MPG-MEGA–Crumbs™ into the diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased by 28,5%, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) in exhaust gas decreased by 30,8 %, the concentration of nitric oxides (NO_x) decreased by 30% and toxicity index improved by 33,1%.

When adding catalyst MPG-MEGA–Crumbs™ into the diesel fuel of the truck Mercedes-Benz reg. no 062 ARU at idling 600 min^{-1}, the concentration of carbon oxide (CO) in exhaust gas decreased by 51,3 %, the concentration of carbon dioxide (CO_2) decreased by10,4 %, the concentration of nitric oxide (NO) decreased by 67,2 %, the concentration of nitric oxides (NO_x) decreased by 67,2 % and toxicity index improved by 44,6 %.

At medium speed 1100 min^{-1} d after the addition of the catalyst MPG-MEGA–Crumbs™ the concentration of carbon oxide (CO) in exhaust gas decreased by 55,9 %, the concentration of carbon dioxide (CO_2) decreased by 2,4 %, the concentration of nitric oxide (NO) decreased by

40,9 %, the concentration of nitric oxides (NO_x) decreased by 41,1 % and toxicity index improved by 55 %.

At maximum speed 2100 min^{-1} the concentration of carbon oxide (CO) in exhaust gas decreased by 26,3 %, the concentration of carbon dioxide (CO_2) decreased by 2%, the concentration of nitric oxide (NO) in exhaust gas decreased by 38,9 %, the concentration of nitric oxides (NO_x) decreased by 38,8 % and toxicity index improved by 27,6 %.

When adding catalyst MPG-MEGA–Crumbs^{TM} into the diesel fuel of the truck Mercedes-Benz reg. no 302 APZ at idling 600 min^{-1}, the concentration of carbon oxide (CO) in exhaust gas decreased by 11,7 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 4 %, the concentration of nitric oxides (NO_x) in exhaust gas decreased by 3,2 % and toxicity index improved by 13,3 %. At medium speed 1100 min^{-1} after the addition of catalyst MPG-MEGA–Crumbs^{TM} into diesel fuel the concentration of carbon oxide (CO) in exhaust gas decreased by 22,2 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) decreased by 26,4 %, the concentration of nitric oxides (NO_x) decreased by 19,8 % and toxicity index improved by 19,1%.

After the addition of catalyst MPG-MEGA–Crumbs^{TM} into the diesel fuel at maximum speed 2100 min^{-1} the concentration of carbon oxide (CO) in exhaust gas decreased by 20,2 %, the concentration of carbon dioxide (CO_2) remained unchanged, the concentration of nitric oxide (NO) in exhaust gas decreased by 13,9 %, the concentration of nitric oxides (NO_x) decreased by 14,2 % and toxicity index improved by 21,6 %.

The special consumption of fuel decreased after the addition of catalyst MPG-MEGA–Crumbs^{TM} into the diesel fuel of truck reg. no 048 MKB by 16,9 % , truck reg. no 062 ARU by 12,3 % and truck reg. no 302 APZ by 13,6 %.

When using the diesel fuels catalyst MPG-MEGA–Crumbs^{TM}, air pollution decreased correspondingly to EU norm 6 normative act 715/2007-2015. Pursuant to normative act 715/2007-2015 the following concentrations in exhaust gas are allowed: carbon oxide (CO) – 0,5 g/km and nitric oxides (NO_x) – 0,08 g/km. These indicators in the tested trucks were as follows: Mercedes-Benz reg. no 048 MKB – the concentration of carbon oxide (CO) 0,35 g/km and the concentration of nitric oxides (NO_x) 0,078 g/km; Mercedes-Benz reg. no 062 ARU – the concentration of carbon oxide (CO) 0,44 g/km and the concentration of nitric oxides (NO_x) 0,06 g/km; Mercedes-Benz reg. no 302 APZ – the concentration of carbon oxide (CO) 0,49 g/km, the concentration of nitric oxides (NO_x) 0,03 g/km.

Thus, all the Mercedes-Benz trucks conform to the Euro 6 norms.

Therefore, on the basis of laboratorial and operational test results we can conclude that the use of fuel catalysts MPG - BOOST™, MPG-Caps and MPG-MEGA–Crumbs™ improves engine performance by increasing engine power output, reducing fuel consumption, diminishing forge scale and carbon formation, prolonging engine lifetime, and reducing the concentration of harmful components in exhaust gas and thus protecting the environment, and the trucks conform to the requirements of Euro 6 normative act 715/2007-2015.