The 11th International Congress
Motor Vehicles & Motors 2026
Kragujevac, Serbia
October 8th-9th, 2026

Motor Vehicles & Motors

MVM2026-015
https://doi.org/10.24874/CMVM2026.015
Original scientific paper

Milan Eremija[1]
Zoran Ristikić[2]
Svetko Milutinović[3]
Mesud Ajanović[4]

EXPERIMENTAL INVESTIGATION OF THE INFLUENCE OF TIRE PRESSURE ON THE ROLLING RESISTANCE COEFFICIENT OF COMMERCIAL VEHICLES

ABSTRACT: This paper presents experimental investigations of the influence of tire pressure on the rolling resistance coefficient in commercial vehicles, with the aim of analysing vehicle operating characteristics under different operating conditions. The experimental investigations were conducted in a vehicle testing laboratory equipped with a chassis dynamometer. Measurements on the chassis dynamometer were performed using the "coastdown" testing method. The testing procedure included accelerating the vehicle to a speed of 40 m/s (144 km/h), after which, with the gearshift lever in the neutral position, the free deceleration method was applied. During the deceleration process, the vehicle speed variation was measured within the range from 104.6 km/h to 8.1 km/h, in order to determine parameters relevant for the analysis of motion resistance and the rolling resistance coefficient. Analysis of the results obtained from the conducted experimental investigations indicated that maintaining a constant rolling resistance coefficient under varying vehicle load conditions requires appropriate adjustment of tire pressures on both the front and rear axles. The obtained results confirm the significant influence of proper tire pressure regulation on the stability of vehicle operating characteristics, energy efficiency, and reduction of motion resistance.

KEYWORDS: commercial vehicle, tires, tire pressure, vehicle load, rolling resistance coefficient.

[1]*Milan Eremija, Senior Assistant, University of East Sarajevo, Faculty of Transport and Traffic Engineering, milan.eremija@sf.ues.rs.ba, https://orcid.org/0009-0000-1551-1231*
[2]*Zoran Ristikić, Assistent professor, University of East Sarajevo, Faculty of Transport and Traffic Engineering, zoran.ristikic@sf.ues.rs.ba,*
[3]*Svetko Milutinovic, Assistant, University of East Sarajevo, Faculty of Transport and Traffic Engineering, svetko.milutinovic@sf.ues.rs.ba,*
[4]*Mesud Ajanović, Full professor, University of East Sarajevo, Faculty of Transport and Traffic Engineering, mesud.ajanovic@sf.ues.rs.ba*

EKSPERIMENTALNA ISTRAŽIVANJA UTICAJA PRITISKA U PNEUMATICIMA NA KOEFICIJENT OTPORA KOTRLJANJA KOD PRIVREDNIH VOZILA

REZIME: U radu su predstavljena eksperimentalna istraživanja uticaja pritiska u pneumaticima na koeficijent otpora kotrljanja kod privrednih vozila, sa ciljem analize eksploatacionih karakteristika vozila u različitim uslovima rada. Eksperimentalna istraživanja su sprovedena u laboratoriji namjenjenoj za ispitivanje vozila opremljenom šasijskim dinamometrom. Mjerenja na šasijskom dinamometru realizovana su primjenom „coastdown“ metode ispitivanja. Postupak ispitivanja obuhvatao je ubrzavanje vozila do brzine od 40 m/s (144 km/h), nakon čega je, pri neutralnom položaju ručice mjenjača, primijenjena metoda slobodnog usporavanja vozila. Tokom procesa usporavanja vršeno je mjerenje promjene brzine vozila u opsegu od 104,6 km/h do 8,1 km/h, sa ciljem određivanja parametara relevantnih za analizu otpora kretanja i koeficijenta otpora kotrljanja. Analizom rezultata dobijenih nakon sprovedenih eksperimentalnih istraživanja utvrđeno je da održavanje konstantne vrijednosti koeficijenta otpora kotrljanja pri promjeni opterećenja vozila zahtijeva odgovarajuću promjenu pritiska u pneumaticima prednje i zadnje osovine. Dobijeni rezultati ukazuju na značajan uticaj pravilne regulacije pritiska u pneumaticima na stabilnost eksploatacionih karakteristika vozila, energetsku efikasnost i smanjenje otpora kretanja.

KLJUČNE REČI: privredno vozilo, pneumatici, pritisak u pneumaticima, opterećenje, koeficijent otpora kotrljanja.

INTRODUCTION

Under real-world operating conditions, a motor vehicle predominantly travels under non-uniform motion. The motion of the vehicle is opposed by various resistive forces that must be overcome by the vehicle's powertrain. The resistances to motion include rolling resistance, aerodynamic drag, grade resistance, acceleration (inertial) resistance, and the resistance associated with a towed vehicle. Vehicle performance is determined not only by the maximum engine torque or maximum engine power, but also by the vehicle's behaviour under partial and full load conditions and at different engine operating regimes.

Rolling resistance arises as a consequence of the continuous deformation of the tyres during rolling contact with the road surface. Its magnitude is affected by tyre characteristics, tyre inflation pressure, vehicle mass, road surface condition, vehicle speed, and tyre geometry and temperature. Incorrect tyre inflation pressure may adversely affect driving safety, ride comfort, and tyre service life, while also increasing fuel consumption and contributing to adverse environmental impacts (Clark & Schuring, 1988; Pillai & Fielding-Russell, 1992; Pillai, 2004; Świeczko-Żurek et al. 2017).

Commercial vehicles are, by virtue of their intended use, subjected to frequent variations in load. Consequently, the tyre inflation pressure appropriate for an unloaded vehicle may not be suitable when the vehicle is loaded. The primary objective of this study was to experimentally determine the functional relationship between vehicle load, tyre inflation pressure, and the rolling resistance coefficient, with particular emphasis on assessing the possibility of maintaining a constant rolling resistance coefficient by adjusting the tyre inflation pressures on the front and rear axles. The topic remains relevant in current regulatory and testing practice. UN Regulation No. 117 continues to regulate tyre rolling resistance and specifies test conditions related to tyre load and inflation pressure, while SAE J2263:2020 and SAE J2264:2023 provide current coastdown-based procedures for road-load determination and chassis-dynamometer road-load simulation, respectively.

ROLLING RESISTANCE AND THE EFFECT OF TYRE INFLATION PRESSURE

Tyres represent the only vehicle components that are in direct contact with the road surface. In addition to safety and ride comfort requirements, tyres have a significant impact on the energy efficiency of a vehicle. Reducing the rolling resistance coefficient decreases tyre deformation and heat generation, while simultaneously reducing fuel consumption and harmful emissions.

The rolling resistance of tyres decreases with increasing inflation pressure on a level road surface, while all other parameters remain constant. As the inflation pressure increases, the vertical deflection and deformation of the tyre decrease, thereby reducing hysteresis losses. On the other hand, variations in vehicle load increase the radial deformation of the tyre sidewall and may increase rolling resistance. In the present investigation, a constant static

tyre radius was used as a practical indicator of approximately constant vertical tyre deflection; however, this assumption does not imply that the contact-patch area, its shape, or the contact-pressure distribution remain strictly constant as load and inflation pressure change (Pillai, 2004; Kühlwein, 2016; Wang et al., 2020).

TEST VEHICLE AND EXPERIMENTAL EQUIPMENT

The experimental investigations were conducted using a Volkswagen light commercial vehicle of category N1, model 7J0 Transporter. The vehicle has a gross vehicle mass of 3000 kg, a curb mass of 1898 kg, and a payload capacity of 1102 kg. It is equipped with six seats and a diesel engine. New Viking WinTech Van 215/65 R16 C 109/107 R tyres were fitted to both the front and rear axles.

The laboratory investigations were conducted at the Technical Laboratory Centre of the Faculty of Transport and Traffic Engineering in Doboj using an AVL Roadsim Chassis Dyno 48″ 4WD MiM chassis dynamometer. This dynamometer belongs to the class of active dynamometers and enables testing of vehicles equipped with front-wheel drive, rear-wheel drive, and all-wheel drive systems. The dynamometer is designed to simulate road load under different vehicle speeds and enables the measurement of vehicle speed, acceleration, tractive force, power, and parameters relevant to the determination of rolling resistance.



Figure 1 Test vehicle positioned on the chassis dynamometer rollers

Prior to the commencement of testing, the dynamometer was warmed up by operating at no load for one hour. The wheelbase of the test vehicle was 3400 mm; therefore, the roller spacing of the dynamometer was adjusted accordingly. The vehicle was subsequently centred and securely restrained. At the rear, the vehicle was secured using the original tow hitch, while at the front it was secured at the designated attachment point for forced towing. The lateral restraints equipped with sensors were used to automatically stop the rollers in the event of lateral displacement of the vehicle.

Tyre inflation pressure was checked using a calibrated pressure gauge, while the ambient temperature in the laboratory during the initial testing was 16.5 °C. The static radius of the unloaded tyre was measured using a height gauge and was found to be 329.2 mm. Eight identical coastdown measurements were performed for each defined test condition. The resulting datasets were processed using the dynamometer software and the mean values were used for further analysis. The repeated measurements were used to assess and reduce the influence of random variation between individual coastdown runs. A complete metrological uncertainty budget was not established in the original experimental programme; therefore, the reported results should be interpreted as repeatability-controlled comparative measurements rather than as a certification measurement of tyre rolling resistance. The principal controlled quantities were tyre pressure, vehicle load, initial tyre condition, test procedure, dynamometer warm-up and laboratory temperature.

METHODOLOGY OF THE EXPERIMENTAL INVESTIGATION

The testing was conducted in two main measurement groups. In the first group, the tyre inflation pressures were kept constant at 3.3 bar on the front axle and 2.9 bar on the rear axle. The vehicle was tested in the unloaded condition and subsequently with additional loads of 200, 400, 600, 800, and 1000 kg. In the second test group, at the same load levels, the tyre inflation pressures were progressively increased with the aim of maintaining a constant static tyre radius of 329.2 mm. In this work, the constant static radius was treated as an experimental constraint intended to keep the vertical tyre deflection approximately unchanged; it was not assumed to guarantee an exactly constant contact-patch area. For the unloaded vehicle, the tyre inflation pressures of 3.3 bar on the front axle and 2.9 bar on

the rear axle were verified. The measured static tyre radius was 329.2 mm. The vehicle was then accelerated to a speed of 40 m/s (144 km/h), after which the transmission selector was shifted into neutral and the vehicle was allowed to decelerate under the action of motion resistances. To improve repeatability, eight identical coastdown tests were performed for each test condition. During free deceleration, the vehicle speed was recorded over the range from 104.6 km/h to 8.1 km/h.

The coastdown measurement records were used to obtain the parameters F_0, F_1, and F_2 employed by the AVL system to describe the effective resistance force as a function of speed under the defined chassis-dynamometer test condition. These parameters are road-load model coefficients and must not be interpreted as tyre rolling-resistance coefficients by themselves. Their use in the present study, including the separation and interpretation of the resistance component attributed to rolling-related losses, is clarified in Section 4.1.

Methodology for Calculating the Rolling Resistance Coefficient

Based on the coastdown test, the AVL chassis-dynamometer software determines the parameters F_0, F_1, and F_2 that approximate the measured resistance force as a function of vehicle speed. In a conventional on-road coastdown test, the resulting road-load polynomial represents the combined road-load force and generally contains rolling, aerodynamic, and other mechanical resistance components (SAE J2263:2020). In the present chassis-dynamometer experiment, the vehicle body is stationary relative to the laboratory air; therefore, the aerodynamic drag associated with the vehicle moving through ambient air at road speed is not physically present in the same manner as in an on-road coastdown test. The AVL adaptation procedure also accounts for dynamometer-related losses. Consequently, the remaining resistance component used in this study predominantly reflects tyre–roller rolling losses together with residual mechanical losses of the drivetrain and rotating components. For this reason, R_k and f_k reported in this paper are interpreted as effective rolling-resistance-related quantities of the complete vehicle under the specified chassis-dynamometer conditions, and not as a standardized tyre-only rolling resistance coefficient obtained according to UN Regulation No. 117 or an ISO/SAE tyre drum test. SAE J2264:2023 provides the current recommended practice for chassis-dynamometer road-load simulation using coastdown techniques.

$$f_k = \frac{R_k}{G}$$

where G denotes the vehicle weight for the respective test condition and R_k denotes the effective rolling-resistance-related force determined from the chassis-dynamometer coastdown model for the selected speed interval. As an example, for the vehicle loaded with an additional mass of 1000 kg, with tyre inflation pressures of 3.3 bar on the front axle and 2.9 bar on the rear axle, the AVL vehicle-related coefficients used in the calculation were F_0 = 276.251, F_1 = 1.4257, and F_2 = 0.005357. The calculated values for the characteristic speed intervals are presented in the following table.

Table 1 Example of the Calculation of Rolling Resistance and the Rolling Resistance Coefficient for an Additional Load of 1000 kg

Speed v [m/s]	Rolling resistance force R_k [N]	Rolling resistance coefficient f_k
5	283,513	0,015131
10	291,044	0,015533
15	298,842	0,015949
20	306,908	0,016380
25	315,242	0,016824
30	323,843	0,017284
35	332,713	0,017757
40	341,850	0,018245
Mean value	311,744	0,016638

Repeatability, Measurement Uncertainty and Static-Radius Assumption

For each test condition, eight coastdown runs were performed using the same test procedure. The mean values were used in subsequent calculations in order to limit the influence of random run-to-run deviations. Because the original experimental programme was not designed as a metrological certification study, expanded measurement uncertainty was not calculated from a complete uncertainty budget. Accordingly, the numerical results are primarily used for comparative analysis between load and inflation-pressure conditions. The constant static radius of 329.2 mm was adopted as a repeatable geometric control parameter representing approximately constant vertical tyre deflection. It should not be interpreted as proof of an exactly constant contact-patch area or contact-pressure distribution, which may change with load and inflation pressure.

Table 2 Tyre Inflation Pressures Used to Maintain a Constant Static Tyre Radius of 329.2 mm

Additional load [kg]	Front axle [bar]	Rear axle [bar]
0	3,3	2,9
200	3,4	3,4
400	3,6	3,9
600	3,8	4,3
800	4,1	4,6
1000	4,5	4,8

ANALYSIS OF THE RESEARCH RESULTS

Variation in Vehicle Load at Constant Tyre Inflation Pressure

The measurement results obtained at constant tyre inflation pressure showed that the rolling resistance coefficient increases with increasing vehicle speed, as well as with increasing vehicle load. For all investigated load levels, the dependence of the rolling resistance coefficient on vehicle speed within the tested range can be approximated with a high degree of accuracy by a linear function.

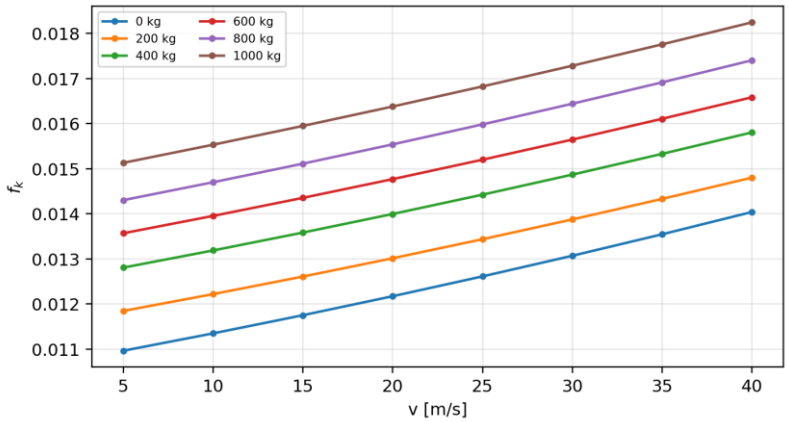


Figure 2 Approximated dependence of the rolling resistance coefficient on vehicle load variation at constant tyre inflation pressure (front axle: 3.3 bar; rear axle: 2.9 bar)

The aforementioned relationship demonstrates that the laboratory investigation confirmed the assumption of a linear functional dependence of the rolling resistance coefficient on changes in vehicle load under constant tyre inflation pressure.

Variation in Vehicle Load with Tyre Inflation Pressure Adjustment

In the second group of measurements, the tyre inflation pressure was increased with increasing vehicle load in order to maintain a constant static tyre radius of 329.2 mm. At an additional load of 200 kg, the tyre inflation pressure was 3.4 bar on both axles, whereas at an additional load of 1000 kg, it was 4.5 bar on the front axle and 4.8 bar on the rear axle.

The measurements showed that, despite maintaining a constant static tyre radius, the effective rolling-resistance-related coefficient increased with increasing total vehicle weight. This behaviour is consistent with increasing radial sidewall deformation and internal hysteresis losses as load increases. Nevertheless, tyre inflation pressure adjustment reduced the increase compared with the test condition in which the inflation pressure remained constant. Because the static radius was used only as a geometric control parameter, the results do not imply that the tyre contact patch remained exactly unchanged.

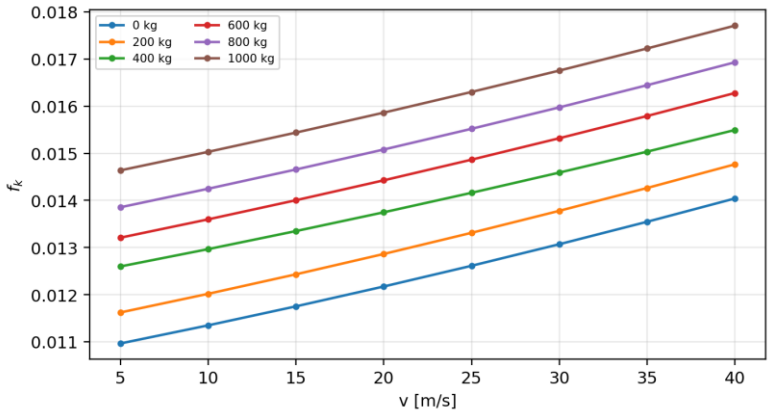


Figure 3 Variation of the rolling resistance coefficient as a function of vehicle speed and load variation in order to maintain a constant static tyre radius (r_s = 329.2 mm)

Table 3 Mean Values of the Rolling Resistance Coefficient at Varying Tyre Inflation Pressure and Constant Static Tyre Radius

Additional load [kg]	Mean value of f_k
0	0.012474
200	0.013133
400	0.013993
600	0.014686
800	0.015338
1000	0.016119

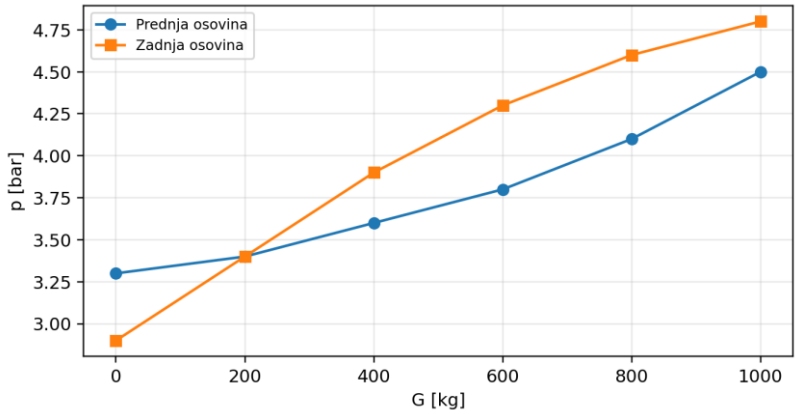


Figure 4 Approximated relationship between tyre inflation pressure on the front and rear axles and vehicle load variation in order to maintain a constant static tyre radius

A direct comparison of the two measurement groups shows that adjusting the tyre inflation pressure to maintain a constant static tyre radius mitigates the increase in the rolling resistance coefficient. The effect of pressure adjustment becomes more pronounced as the vehicle load increases; however, the rolling resistance coefficient does not return to the value corresponding to the unloaded vehicle.

Table 4 Comparative Mean Values of the Rolling Resistance Coefficient for the Two Test Conditions

Additional load [kg]	Constant tyre inflation pressure f_k	Tyre inflation pressure adjustmentf_k	Reduction [%]
0	0,012474	0,012474	0,00
200	0,013269	0,013133	1,02
400	0,014252	0,013993	1,82
600	0,015024	0,014686	2,25
800	0,015800	0,015338	2,92
1000	0,016638	0,016119	3,12

Tyre Inflation Pressure Required to Maintain a Constant Rolling Resistance Coefficient

Since maintaining a constant static tyre radius was not sufficient to keep the rolling resistance coefficient constant, the obtained functions were approximated. Based on the resulting mathematical relationships, the tyre inflation pressures for the front and rear axles were calculated for different vehicle load levels, with the aim of maintaining an approximately constant value of the rolling resistance coefficient.

Table 5 Calculated Tyre Inflation Pressure Values Required to Maintain a Constant Rolling Resistance Coefficient

Additional load [kg]	Front axle [bar]	Rear axle [bar]
0	3.300	2.900
200	3.368	3.491
400	3.435	4.082
600	3.502	4.673
800	3.570	5.264
1000	3.638	5.855

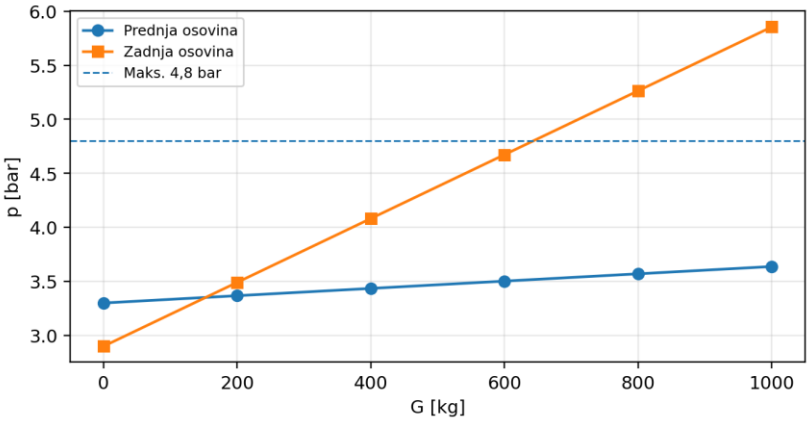


Figure 5 Approximated relationship between tyre inflation pressure on the front and rear axles and vehicle load variation in order to maintain a constant rolling resistance coefficient

The obtained values indicate a practical limitation to the application of such a pressure regulation strategy. The tyres fitted to the test vehicle have a maximum permissible inflation pressure of 70 psi, corresponding to approximately 4.8 bar. For additional loads exceeding 600 kg, the calculated tyre inflation pressure for the rear axle exceeds this limit, whereas the inflation pressures for the front axle remain below the permissible value. Therefore, at higher load levels, particular attention must be paid to the selection of tyres with appropriate structural characteristics and a suitable permissible inflation pressure. It is particularly important to note that the mathematically determined inflation pressure required to maintain a constant rolling resistance coefficient does not automatically constitute a technically permissible value. For the rear axle, the calculated inflation pressure was 5.264 bar at an additional load of 800 kg and 5.855 bar at an additional load of 1000 kg, both of which exceed the maximum permissible pressure of approximately 4.8 bar for the tyres used in the test. Consequently, the established functional relationship must be interpreted in conjunction with the load-carrying capacity, structural characteristics, and permissible inflation pressure of the specific tyre.

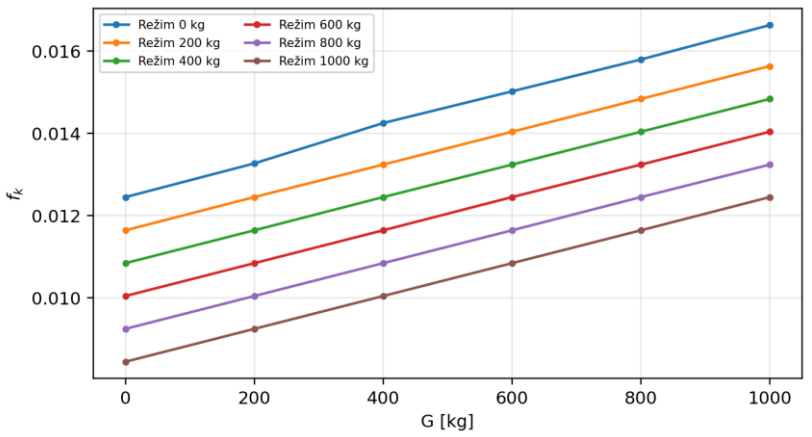


Figure 6 Approximated relationship between the rolling resistance coefficient, tyre inflation pressure, and vehicle load, with the aim of maintaining a constant rolling resistance coefficient under laboratory test conditions

DISCUSSION OF THE RESEARCH RESULTS

The results of the laboratory investigation demonstrate that vehicle load and tyre inflation pressure are interrelated parameters that cannot be considered independently when analysing the rolling resistance of a commercial vehicle. At constant tyre inflation pressure, an increase in the additional load from 0 to 1000 kg resulted in an increase in the mean rolling resistance coefficient from 0.01247 to 0.01664. When the tyre inflation pressure was adjusted with the aim of maintaining a constant static tyre radius, the mean rolling resistance coefficient at an additional load of 1000 kg was 0.01612. Thus, the increase in rolling resistance was mitigated, but not completely eliminated. A comparison of the mean values shows that, at an additional load of 1000 kg, pressure adjustment while maintaining a constant static tyre radius reduced the rolling resistance coefficient from 0.016638 to 0.016119, corresponding to a reduction of approximately 3.1% compared with the constant-pressure condition. This result demonstrates that tyre inflation pressure adjustment has a measurable effect, while simultaneously confirming that maintaining a constant static tyre radius from a geometrical perspective is insufficient to completely eliminate the effect of the increased vehicle mass.

The observed trends are consistent with the findings reported by Clark and Schuring (1988) and Pillai (2004), according to which vehicle load and tyre inflation pressure are major factors affecting rolling losses. More recent studies support the continued relevance of these parameters. Wang et al. (2020) showed that tyre load and inflation pressure alter both contact stresses and rolling resistance in truck/bus tyres, while Zhu and Yan (2023) experimentally investigated the combined effects of speed, inflation pressure, load and temperature on heavy-duty tyre rolling resistance. Ejsmont et al. (2024) further emphasized that rolling-resistance results depend strongly on the measurement method and test surface. The present results complement these studies by describing the response of a complete light commercial vehicle under controlled load variations on a chassis dynamometer. The findings also support the interpretation that static tyre radius alone cannot fully characterize rolling losses because internal deformation, hysteresis, load distribution and tyre–roller interaction remain relevant.

From a practical perspective, the results confirm the need to adjust tyre inflation pressure in commercial vehicles according to the actual vehicle load, but strictly within the limits specified by the tyre and vehicle manufacturers. Increasing the inflation pressure beyond the permissible value solely to reduce rolling resistance is unacceptable. When a particular load condition requires an inflation pressure exceeding the permissible limit, the appropriate solution should be sought through the selection of tyres with a higher load-carrying capacity or with different structural characteristics.

CONCLUSION

Based on the laboratory investigations conducted on the AVL Roadsim Chassis Dyno 48″ 4WD MiM chassis dynamometer, it can be concluded that tyre inflation pressure has a significant effect on the effective rolling-resistance-related coefficient of the tested light commercial vehicle under the specified laboratory conditions. The coastdown testing method enabled the determination of speed-dependent resistance parameters and comparative analysis at different vehicle speeds, load levels and tyre inflation pressures. At constant tyre inflation pressures of 3.3 bar on the front axle and 2.9 bar on the rear axle, a nearly linear relationship was obtained between the calculated effective coefficient and additional vehicle load. The results should be interpreted as complete-vehicle chassis-dynamometer measurements rather than as standardized tyre-only rolling resistance values.

Adjustment of tyre inflation pressure with the aim of maintaining a constant static tyre radius reduced the increase in the rolling resistance coefficient; however, a constant value of the coefficient could not be achieved. This was primarily attributed to the additional radial deformation of the tyre sidewalls resulting from the increase in vehicle load. Approximation of the obtained functions established the functional relationship between the tyre inflation pressures on the front and rear axles and vehicle load required to maintain a constant rolling resistance coefficient. The obtained results indicate that appropriate tyre selection and adjustment of tyre inflation pressure in accordance with vehicle load and the permissible pressure limits can reduce motion resistance, tyre deformation, and heat generation. Consequently, this may contribute to reduced fuel consumption, transportation costs, and harmful emissions, while maintaining the required safety and vehicle handling characteristics.

REFERENCES

Clark, J. D., & Schuring, D. J. (1988). Load, speed and inflation pressure effects on rolling loss distribution in automobile tires. *Tire Science and Technology*, 16(2), 78–95. https://doi.org/10.2346/1.2148800

Ejsmont, J., Ronowski, G., Ydrefors, L., Owczarzak, W., Sommer, S., & Świeczko-Żurek, B. (2024). Comparison of tire rolling resistance measuring methods for different surfaces. *International Journal of Automotive Technology*, 25, 965-976. https://doi.org/10.1007/s12239-024-00092-w

Kühlwein, J. (2016). Driving resistances of light duty vehicles in Europe: Present situation, Trends, and scenarios for 2025. ICCT White Paper. https://theicct.org/wp-content/uploads/2021/06/ICCT_LDV-Driving-Resistances-EU_121516.pdf

Pillai, P. S. (2004). Effect of tyre overload and inflation pressure on rolling loss (resistance) and fuel consumption of automobile and truck/bus tyres. *Indian Journal of Engineering & Materials Sciences*, 11, 406–412.

Pillai, P. S., & Fielding-Russell, G. S. (1992). Tire rolling resistance from whole-tire hysteresis ratio. *Rubber Chemistry and Technology*, 65(2), 444–452.

SAE International: Road Load Measurement Using Onboard Anemometry and Coastdown Techniques. SAE Recommended Practice J2263_202005, revised May 2020. https://doi.org/10.4271/J2263_202005

SAE International: Chassis Dynamometer Simulation of Road Load Using Coastdown Techniques. SAE Recommended Practice J2264_202301, revised January 2023. https://doi.org/10.4271/J2264_202301

Świeczko-Żurek, B., Ronowski, G., & Ejsmon, J. (2017). Tyre rolling resistance and its influence on fuel consumption. *Combustion Engines*, 168(1), 62–67. https://doi.org/10.19206/CE-2017-110

United Nations Economic Commission for Europe (UNECE): UN Regulation No. 117 - Tyres, Rolling Resistance, Rolling Noise and Wet Grip, Revision 6, Amendment 2, 2025.

Wang, H., Al-Qadi, I. L., & Stanciulescu, I. (2020). Analysis of contact stresses and rolling resistance of truck-bus tyres under different working conditions. *Sustainability*, 12(24), 10603. https://doi.org/10.3390/su122410603

Zhu, C., & Yan, J. (2023). Experimental investigation on rolling resistance and temperature of the heavy-duty vehicle tires. *SAE Technical Paper*, 2023-01-0754. https://doi.org/10.4271/2023-01-0754