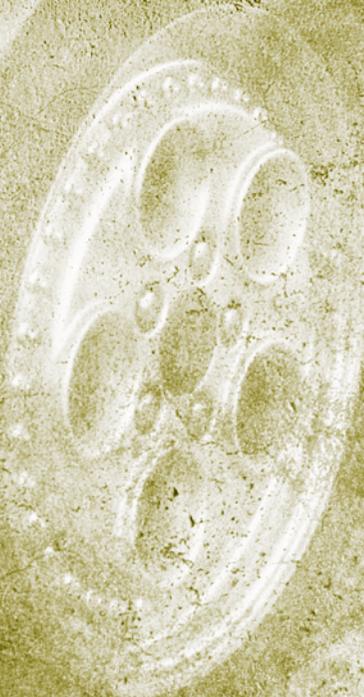


EU LEONARDO DA VINČI PROJECT No. LT/01/B/F/PP-137 011



TEACHER'S
BOOK

TURINYS

INTRODUCTION	69
1. MOTOR VEHICLE MECHANIC'S VOCATIONAL EDUCATION AND TRAINING PROGRAMMES: COMPARATIVE ANALYSIS OF LITHUANIAN, GERMAN AND FINNISH PROGRAMMES	71
2. PARAMETERS OF MOTOR VEHICLE MECHANIC'S VOCATIONAL TRAINING MODULES	79
3. TRAINING MODULES: CHASSIS, CAR MOTOR AND TRANSMISSION MECHANISM	87
3.1. Module: Diagnostics and repair of the vehicle chassis	89
3.2. Module: Diagnostics of car motor management system	93
3.3. Module: Diagnostics and repair of the transmission mechanism	97
4. METHODOICAL MATERIAL FOR THE MODULE "TECHNICAL DIAGNOSTICS AND REPAIR OF THE CHASSIS"	101
4.1. Learning topics	103
4.2. Evaluation test	125



Introduction

The aim of tutor's book, created during Leonardo da Vinci programme's pilot project No. LT/01/B/F/PP-137 011 OPTIMISATION OF VET PROGRAMMES FOR EMPLOYABILITY ENHANCEMENT, is to give an methodological assistance for teachers, who are designing training programmes and modules. According to the needs of the present labour market, taking into consideration tendencies in auto-mechanics sector and analysis of the training programmes, partners of the project structured parameters for the vocational training modular programme. Composed and structured 8 modules are presented in this tutor's book:

1. Chassis.
2. Transmission.
3. Engine.
4. Engine's management systems.
5. Motor body.
6. Motor's management systems.
7. Motor's electronic systems.
8. Supply systems. Diagnostics repair and maintenance.

During the project were designed and tested 3 of these modules:

1. Chassis. Diagnostics and repair.
2. Transmission. Diagnostics and repair.
3. Engine's management systems.

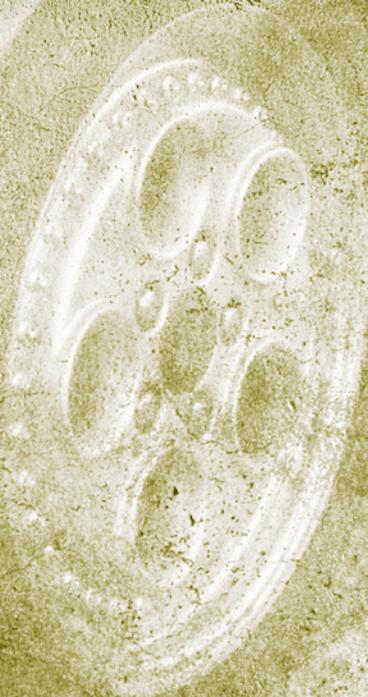
According to the designed module's samples it is possible to design all the other modules.

Completely designed module of "Chassis. Diagnostics and repair" is rubricated to the 16 themes. For every theme are planned standards, which will help for the teacher to set training demands for the students: training goals, training objects, training content, training strategies, resources, assessment plans (specifications, ways of assessment) and final assessment of module – test.

Using this model of structured modular programmes, teachers will be able to design and complete others auto-mechanic sector's modules.

Tutor's book's methodological information was designed for vocational training teachers assistance in Lithuania and in EU countries.





**MOTOR VEHICLE
MECHANIC'S VOCATIONAL
EDUCATION AND TRAINING
PROGRAMMES: COMPARATIVE
ANALYSIS OF LITHUANIAN,
GERMAN AND FINNISH PROGRAMMES**

Motor vehicle mechanic's vocational education and training programmes: comparative analysis of Lithuanian, German and Finnish programmes

Title of the programme, training duration, level, entrance requirements provided qualifications	Work functions	Competencies and core skills	Ration of theoretical and practical training	Specialisation	Technical and technological training basis
LITHUANIA					
<p>Motor vehicle mechanic Duration and level: 2 – 3 years / level 3 (According to ISCED: initial vocational training / ISCED 97 3 level) Minimal scope of the teaching programme – 2960 teaching hours. Requirements for the entrance to the training: For level 3 teaching – basic secondary education (9 years). Conferred qualifications: motor vehicle me-</p>	<p>1. Technical maintenance and diagnostics of motor vehicles. 2. Repair of motor vehicle aggregates and systems. 3. Cleaning and washing the parts and their quality assurance. 4. Lubrication and oil changing work. 5. Selection of spare parts, units and operational material and changing ensuring the necessary level of motor vehicle</p>	<p>1.1. To evaluate the technical state of motor vehicle systems and aggregates on the basis of external characteristics of the motor vehicle. 1.2. To determine the parameters of motor vehicle mechanism and system functioning using instruments and devices of technical diagnostics. 1.3. To perform the determined technical maintenance procedures according to manufacturer instructions and recommendations, meet the set work safety and environment protection requirements. 1.4. To use fitter tools and technological technical maintenance equipment safely and purposefully. 1.5. To perform fitter metal and similar material work. 1.6. To have the necessary welding skills and competencies: gas welding, electricity welding, brazing. 1.7. To dismantle motor vehicle mechanisms, aggregates and systems according to manufacturer technological requirements. 2.2. To determine breakdowns (fault finding), their causes and eliminate them.</p>	<p>Practical training amounts to at least 70% of the whole training time (minimum 800 hours of practical training in workshops) in 2 year programmes; the ratio of theoretical and practical work is: theoretical training 30% - 37% / practical 63% - 70%. In 3 year programmes the ratio of theoretical and practical training is:</p>	<p>Specialisation</p>	<p>Equipment and tools: Motor vehicle lifts – 3; Wheel mounting stand; Wheel balancing stand - 2; Electrical device control stand – 2 Injection test and tune-up stand – 1 Light adjustment stand – 1 CO gas analyser - 1 Body repair and geometry reconstruction stand – 1 Painting equipment</p>
<p>Motor vehicle mechanic Duration and level: 2 – 3 years / level 3 (According to ISCED: initial vocational training / ISCED 97 3 level) Minimal scope of the teaching programme – 2960 teaching hours. Requirements for the entrance to the training: For level 3 teaching – basic secondary education (9 years). Conferred qualifications: motor vehicle me-</p>	<p>1.1. To evaluate the technical state of motor vehicle systems and aggregates on the basis of external characteristics of the motor vehicle. 1.2. To determine the parameters of motor vehicle mechanism and system functioning using instruments and devices of technical diagnostics. 1.3. To perform the determined technical maintenance procedures according to manufacturer instructions and recommendations, meet the set work safety and environment protection requirements. 1.4. To use fitter tools and technological technical maintenance equipment safely and purposefully. 1.5. To perform fitter metal and similar material work. 1.6. To have the necessary welding skills and competencies: gas welding, electricity welding, brazing. 1.7. To dismantle motor vehicle mechanisms, aggregates and systems according to manufacturer technological requirements. 2.2. To determine breakdowns (fault finding), their causes and eliminate them.</p>	<p>Practical training amounts to at least 70% of the whole training time (minimum 800 hours of practical training in workshops) in 2 year programmes; the ratio of theoretical and practical work is: theoretical training 30% - 37% / practical 63% - 70%. In 3 year programmes the ratio of theoretical and practical training is:</p>	<p>Specialisation</p>	<p>Specialisation</p>	<p>Equipment and tools: Motor vehicle lifts – 3; Wheel mounting stand; Wheel balancing stand - 2; Electrical device control stand – 2 Injection test and tune-up stand – 1 Light adjustment stand – 1 CO gas analyser - 1 Body repair and geometry reconstruction stand – 1 Painting equipment</p>

Title of the programme, training duration, level, entrance requirements provided qualifications	Work functions	Competencies and core skills	Ration of theoretical and practical training	Specialisation	Technical and technological training basis
<p>chamic, motor vehicle driver, specialist in agriculture technical maintenance and repair</p>	<p>quality. 6. Work with motor vehicle diagnostic technical maintenance and repair equipment, and diagnostic information and data analysis. 7. The first medical aid for the injured. 8. Financial accounting of motor vehicle technical maintenance and repair work. 9. Communication with the customers. 10. Driving. Fostering employment.</p>	<p>2.3. To assemble, tune-up, adjust and test motor vehicle mechanisms, aggregates and systems. 3. To wash and clean parts, perform part defectation in a qualitative way. 4. To check the level of oil and consumables in mechanisms and systems, evaluate the state of oil, lubricants and other running liquids, change oil, lubricants and other running liquids. 5. To select the necessary and suitable spare parts and change the defected parts, properly select the appropriate construction and running material. 6. To apply measuring, diagnostic, quality assurance instruments and equipment; to find the necessary technical and technological information from various resources and use it in technological process. 7. To deliver the first medical aid to the injured. 8. To perform and manage initial motor vehicle maintenance and repair work accounting; to control work accounting processes and analyse company work results. 9. To develop polite communication with customers in the native and foreign language skills; to explain to the client the technical state of his (her) motor vehicle, its impact upon the safety of motor vehicle exploitation, environment, economic parameters of maintenance, to provide the customer with comprehensive and precise</p>	<p>theoretical 40% practical 60%.</p>	<p>maintenance of motor vehicles and their systems. 4. Managerial functions of motor vehicle repair workshops – financial accounting and work with customers. Specialisation of such time is peculiar to large service companies. Vocational schools are oriented to training motor vehicle mechanics of broad qualification.</p>	<p>Engine diagnostics stand Lithuanian vocational schools working in the motor vehicle mechanic vocational training area renovation and reconstruction of the current technical basis.</p>

		<p>information about the detected faults, ways to eliminate them, duration of the repair and work costs. .</p> <p>10. Good driving skills and knowledge.</p> <p>11. To know the business environment to evaluate one's possibilities to find a job; to apply the acquired professional knowledge in starting own business.</p>			
GERMANY					
<p>Motor vehicle mechanic, Duration: 3,5 years. Vocational training level: initial vocational training / ISCED 97 level 3 Requirements for the entrance to the training: 9-10 years of the basic secondary education Conferred qualification: qualified employee in motor vehicle mechanics</p>	<ol style="list-style-type: none"> 1. Vocational education and training. 2. Structure and organisation of educational institutions. 3. Work law, law of collective negotiations, work safety, environment protection requirements. 4. Work safety, environmental protection and rational use of resources. 5. Work process planning and preparation, work result evaluation and monitoring. 6. Reading of 	<p>1. Work planning, quality assurance, work organization.</p> <p>2. Inspection and measuring work in motor vehicles, first of all, related to:</p> <ol style="list-style-type: none"> 2.1. Ability to dismantle and assemble motor vehicle systems. 2.2. Ability to read and use chain diagrams, flow charts, technical drawing during faultfinding, know the marking of terms and symbols of connecting elements. <p>3. Perform repair tasks in various motor vehicle type systems (feed of electric current including generator, light system, warming and signalling equipment, engine, engine accessories, cooling system, exhaust gas equipment, start-up equipment/starter, engine control and fuel feed, gear/transmission and clutch, brake system, axle control, chassis with wheel and tyre mounting, body parts and internal cover). To be able to use breakdown assessment technical means and prepare to deliver the motor vehicle to the customer.</p> <p>4. To perform technical maintenance and inspection work according to the manufacturer instructions and legal requirements.</p>	<p>Theoretical teaching: 30%</p> <p>Practical training: 70%</p>	<p>Three directions of specialisation during the third and fourth year of the programme:</p> <ol style="list-style-type: none"> 1. Technical maintenance of the motor vehicle 2. Technical maintenance of trucks 3. Technical maintenance of motorcycles. <p>Every mechanic can work in all three areas irrespective the specialisation chosen in the programme.</p>	<p>Technical-technological training basis:</p> <ol style="list-style-type: none"> 1. Diagnostics instruments (expert systems, scanning devices). 2. Technical information systems. 3. Computerised equipment (automatic inspection programme for engine control system diagnostics). 4. Equipment for chassis and axles diagnostics. <p>Special instru-</p>

Title of the programme, training duration, level, entrance requirements provided qualifications	Work functions	Competencies and core skills	Ration of theoretical and practical training	Specialisation	Technical and technological training basis
	<p>technical documentation, use and preparation.</p> <ol style="list-style-type: none"> 7. Checking and measuring. 8. Assemblage. 9. Manual processing. 10. Mechanical processing. 11. Technical maintenance. 12. Welding, thermal cutting. 13. Electric technology, electronics. 14. Hydraulics, pneumatics. 15. Dismantling and assembling of components, aggregates and systems during the motor vehicle technical maintenance. 16. Technical maintenance of motor vehicles. 17. Inspection, tuning and connecting mechanical, hydraulic, pneumatic, electric and electronic systems and units. 18. Inspection of exhaust gas and reduction of dangerous pollution elimination to the environment equipment. 19. Fault finding, detecting their causes. 20. Repair of motor vehicle systems and their components. 21. Repair of motor vehicle structural and covered components and aggregates. 22. Extra units and installations mounting work. 23. Estimation of the breakdowns and damage done to a motor vehicle. 24. Monitoring of the work being performed. 	<ol style="list-style-type: none"> 5. To perform diagnostic work using measuring devices and fault detecting scanners; to evaluate breakdown codes and use faultfinding strategies according to diagnostic instructions; to determine breakdown causes. 6. To perform visual inspection and check by using sound hearing method. 7. To perform exhaust gas analysis. 8. To perform chassis measurements. To inspect breakdowns on the basis of the customer's evidence and determine the repair costs. 			<p>ments and devices for diverse motor vehicle system repair.</p>

FINLAND

<p>Motor vehicle mechanic Programme duration: 120 training weeks (3 years) Vocational education and training level according to ISCED 97: 3. Requirements for the entrance to learning: basic secondary education 9 – 10 years. Conferral qualification: motor vehicle mechanic.</p>	<p>General education subjects: native language and communication, Swedish language, English language, mathematics, physics and chemistry, practical training, social studies and law, optional courses. Basic occupational subjects (30 training weeks): Information technologies in the motor vehicle. Technical drawing. Material technologies. Metal processing practical training. Mechanical processing and assemblage technologies. Basics in electrical engineering. Practical training in electrical engineering. Basics in hydraulics and pneumatics. Motor vehicle construction. Motor vehicle technical service. Special occupational subjects (60 training weeks): Chassis and transmission technical service Engine and electrical equipment technical service Basics in diagnostics Automatics engineering Mechanical breakdown detection Electrical par fault finding Material science and welding Repair of motor vehicle parts Body repair Analysis of breakdowns and calculation of repair costs Body measurement Motor vehicle painting Optional occupational subjects (10 training wheels): Engine repair Engine control system repair Body repair</p>	<p>1. To perform mechanical and electric system breakdown detecting and defect diagnostic work. 2. To perform technical maintenance and inspection work according to manufacturer instructions. 3. To perform body repair and painting work according to the manufacturer instructions. 4. To follow work safety requirements and rules.</p>	<p>Theoretical teaching: 30% Practical training: 70%</p>	<p>Exceptional direction of specialisation: racing cars technology.</p> <p>Technical-technological training basis:</p> <ol style="list-style-type: none"> 1. Diagnostics devices. 2. Computerised measuring equipment. 3. Cylinder head repair equipment. 3. Wheel balancing system (4 – points). 4. Dynamometer. 5. Test stand. 6. Body repair platforms and measuring equipment. <p>Painting camera.</p>
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Conclusions of the comparative analysis:

1. In their general features the teaching programmes under analysis and standards are similar. This is particularly well illustrated by the following parameters: programme duration (3-3,5 years), vocational education level (ISCED 97 level 3), entrance requirements (basic secondary education – 9, 10 years).
2. The content of competences in the programmes under analysis is rather similar. German vocational education and training programmes distinguish themselves by comprehensive and accurate technical motor vehicle occupational knowledge and skill descriptions which provide more information about the content of motor vehicle qualification.
3. Motor vehicle specialisations in the analysed programmes are also rather similar. A general feature is intention to train specialists of broad qualification in motor vehicle vocational education and training programmes and standards in all the countries. Motor vehicle mechanics can work with vehicles of various types – cars, trucks, and motorcycles.

As Lithuanian partners included into their analysis training programmes for preparation of the specialists for agricultural machinery service and repair in agricultural schools, their analysis indicates this specialisation. Finnish partners indicated racing cars technology specialisation.

4. The ration of theoretical and practical training is similar in all the programmes under analysis: theoretical training takes up 30% on average, whereas practical training - 70 % of the whole training time.
5. Localisation of practical training differs. In Lithuania, the larger part of practical training is provided in school workshops. Company involvement in this area is comparatively low. In Germany, practical training is provided on the job place in companies and, in addition, in training centres founded by the companies (berbetriebliche Berufsbildungsstätten). In Finland, practical training is provided in local motor repair workshops (garages).





**PARAMETERS OF
MOTOR VEHICLE
MECHANIC'S VOCATIONAL
TRAINING MODULES**

2. Parameters of motor vehicle mechanic's vocational training modules

2.1. Motor vehicle body repair and painting

Module objectives	Target group	Module outcomes	Module content	Form of assessment	Module range and forms
<p>1. To acquire knowledge and skills in motor vehicle body diagnostics (material science, body diagnostics technology, etc.)</p> <p>2. To acquire knowledge and skills in motor vehicle body repair (sheet metal processing technologies, metalwork).</p> <p>3. To acquire knowledge and skills in motor vehicle painting and surface finish (types of material used for body painting and their use, body priming, putting and painting, inspection of the painted surface and finishing technologies).</p>	<p>Vocational school students, the unemployed learning in labour market vocational training programmes, service workshop employees</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> To evaluate the technical state of motor vehicle body. To identify body breakdowns, defects, and deformation features. To select appropriate and rational method to repair motor vehicle body. To repair motor vehicle front and rear wings, doors, thresholds (altar), boot, to abrade, putter and prime body parts. To prepare motor vehicle body for painting. To choose pain according to the mark, colour, glance, resistance to impact and deformations. To choose paint and primer dissolvent and hardeners. To use polishing, painting and drying devices and equipment. To paint motor vehicle body. To determine and eliminate defects of the painted body surface. 	<ol style="list-style-type: none"> Motor vehicle body faults and defects. <ol style="list-style-type: none"> Body faults, defects, deformations and their kinds. Corrosion causes and ways to eliminate it Anticorrosion material qualities and their application ways. Motor vehicle body repair technology. <ol style="list-style-type: none"> Motor vehicle body repair methods. Body diagnostics and dismantlement. Mechanical processing of sheet metal. Dismantlement, planishing, repairing, putting and priming of body parts: bonnet, front and rear wings, front panel, roof, door, luggage compartment bottom and lid, sills, poremio silt, front and rear bumpers. Motor vehicle body painting technology. <ol style="list-style-type: none"> Preparation of motor vehicle body for painting. Materials used for body painting, their marks, and chemical and physical qualities. Painting tools and equipment, their maintenance. Drying ways and regimes of the painted surface. Finishing of the painted surface, tools and equipment used for grinding and polishing. Quality assessment of the painted surface. Work security and environmental protection requirements. 	<p>Final examination</p>	<p>320 hours</p>

2.2. Technical maintenance and repair of motor vehicle control equipment

Module objectives	Target group	Module outcomes	Module content	Form of assessment	Module range and forms
<p>1. To acquire knowledge and skills in motor vehicle control equipment technical maintenance (materials and parts used in hydraulic and pneumatic system maintenance, tune-up of hydraulic and pneumatic brake system).</p> <p>2. To acquire knowledge and skills in motor vehicle control equipment repairing (hydraulic and pneumatic brake system repairing, metalwork, etc.)</p>	<p>Vocational school students, unemployed trainees in labour market vocational training programmes, service workshop employees.</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> To understand car and truck steering wheel and brake construction peculiarities, hydraulic vacuum brake servo functioning, ABS system functioning. To assess the technical state of motor vehicle control mechanism aggregate units and parts. To regulate motor vehicle control equipment functioning parameters: motor vehicle parking brake control, steering rod joints, steering wheel freeheeling, brake shoe clearance, brake pedal freeheeling, pneumatic brake valve gear and brake linkage, to release air from hydraulic brake system. Defect and change parts: air compressor's gear belt, steering linkage joints, front and rear wheel brake shoes. To change the amount of oil in hydraulic pump tank. 	<p>1. Motor vehicle control equipment.</p> <ol style="list-style-type: none"> Purpose, structure, types of motor vehicle control equipment. <p>2. Purpose, construction, functioning and types of wheel.</p> <ol style="list-style-type: none"> Steering linkage and mechanism, its structure, functioning and breakdowns. Functioning, structure, breakdowns of hydraulic hydrosteering gear. Brake systems. <ol style="list-style-type: none"> Types, purpose, structure and functioning of brake systems. Construction, functioning and maintenance of hydraulic brake system. Functioning and breakdown of vacuum-hydraulic master servo, parking brake of hydraulic brakes. Construction, purpose, functioning and breakdowns of pneumatic brake system. Air compressors, brake valves, bulbs, reducers, valves, trailer air control valve, wheel brake actuators, parking brake, its functioning and tuning-up. Brake ABS purpose, structure, functioning and types, possible breakdowns, their causes and ways of eliminating. <p>Work safety and environmental protection requirements in performing technical inspection of motor vehicle control equipment.</p>	<p>Final examination</p>	<p>120 hours</p>

2.3. Diagnostics, repairing and technical maintenance of motor vehicle electrical equipment

Module objectives	Target group	Module outcomes	Module content	Form of assessment and forms	Module range and hours
<p>1. To acquire knowledge and skills in motor vehicle electrical equipment technical (electrotechnical material science, theory of electrotechnics, measurement devices, technology of electrical equipment diagnostics),</p> <p>2. To acquire knowledge and skills in motor vehicle electrical equipment repairing (making electrical schemes of electrical equipment, metalwork, etc.)</p>	<p>Vocational school students, unemployed, training in labour market vocational training programmes, service workshop employees.</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> 1. To make up and read schemes of electrical connection. 2. To assemble and dismantle motor vehicle electrical equipment. 3. To connect the source of electrical power correctly. 4. To perform the diagnostics of motor vehicle electrical equipment with the help of various measurement devices applied in electrotechnology. 5. On the basis of general requirements and manufacturer instructions, to perform motor vehicle electrical equipment repairing work. 5.1. Repairing the defected electrical parts. 5.2. Replacing the defected electrical parts with the new ones 6. On the basis of general technical requirements and manufacturer instructions, to perform technical inspection of motor vehicle electrical system and its parts: technical maintenance of accumulators and generators, technical maintenance of relays, starters, ignition systems, lightning equipment, switches and installations. 7. To obey the electrotechnical work safety rules of in the work process. 	<ol style="list-style-type: none"> 1. Basics in electrotechnics. 2. Types, kinds, features and use of electrotechnical materials. 3. Types and purpose of motor vehicle electrical equipment. 4. Means of motor vehicle electrical equipment diagnostic measuring. 5. Technology of motor vehicle electrical equipment diagnostics. 6. Technical maintenance of motor vehicle electrical equipment. 7. Basics in metalwork. 8. Terminology in electrotechnics used in foreign manufacturer instructions and similar documents. 	<p>Final examination</p>	<p>400 hours</p>

2.4. Diagnostics, repairing and technical maintenance of motor vehicle feed system

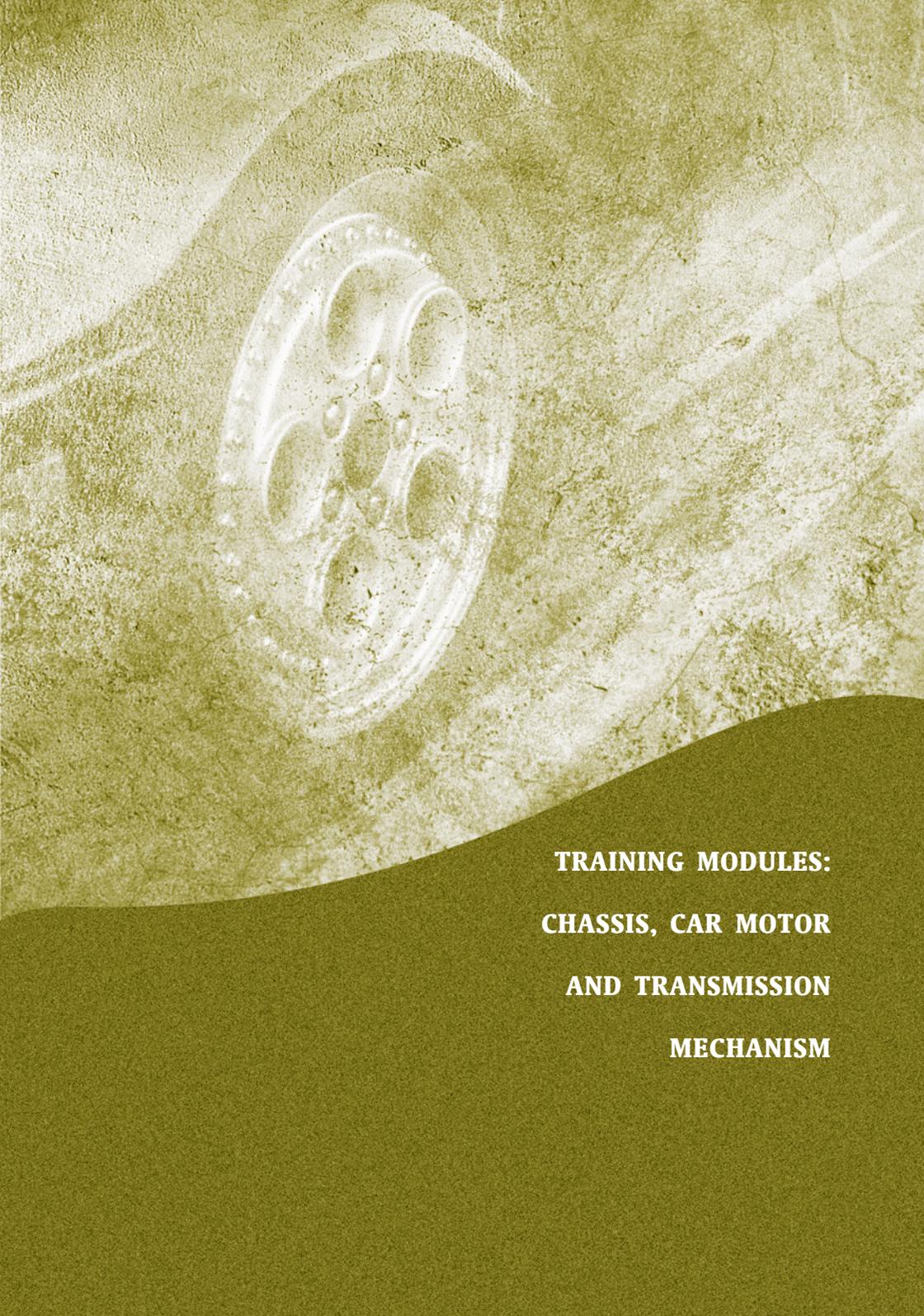
Module objectives	Target group	Module outcomes	Module content	Form of assessment	Module range and forms
<p>1. To be able to evaluate technical state of the feed system and perform diagnostics.</p> <p>2. To acquire knowledge and skills in repairing motor vehicle feed systems.</p> <p>3. To acquire knowledge and skills in technical maintenance of motor vehicle feed systems.</p>	<p>Vocational school students, unemployed training in labour market vocational training programmes, service workshop employees.</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> 1. To identify the technical state of the feed systems and their work parameters. 2. To diagnose breakdowns in motor vehicle feed systems with the help of control measurement and diagnostic means. 3. To eliminate the detected feed system combustion performing dismantling, assembling, part repair, part replacement and adjusting of the assembled system. 4. To perform technical maintenance of motor vehicle feed systems (fuel tank, pipes, filters, fuel pumps, nozzles, carburettor, inspection and adjustment of their functioning). 	<p>1. Material science – fuel, motor vehicle running liquids.</p> <p>2. Structure and functioning of compression ignition engine feed system.</p> <p>3. Structure and functioning of petrol low compression engine feed system.</p> <p>4. Petrol injection systems, their structure and functioning.</p> <p>5. Diagnostics and repair of compression ignition engine feed systems.</p> <p>6. Diagnostics and repair of petrol low compression engine feed system.</p> <p>7. Diagnostics and repair of petrol injection systems.</p>	<p>Final examination</p>	<p>400 hours</p>

2.5. Diagnostics, repair and technical maintenance of motor vehicle engine and its systems

Module objectives	Target group	Module outcomes	Module content	Form of assessment	Module range
<p>To acquire theoretical knowledge and skills in diagnostics, repair and technical maintenance of motor vehicle engine and its systems:</p> <ol style="list-style-type: none"> 1. Identification of the engine mark, engine work parameters under various rotations of engine main shaft. 2. Identification of engine cooling and ignition system work parameters. 3. Identification of the general technical state of the engine. 4. Performance of engine dismantling and assembling work. 5. Defectation and repair of the engine cylinder block and cylinder heads. 6. Defectation and performance of the repair of crankshaft and connecting rod mechanism. 7. Defectation of gas distribution mechanism, repair of its parts or replacement. 8. To perform diagnostics, repair and technical maintenance work of engine ignition system. 9. Performance of engine technical maintenance operations: replacement of oil, cooling water, tuning of the generator and distribution mechanism belt-tension. 	<p>Vocational school students, unemployed, and in labour market</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> 1. To identify technical state of the engine and its work parameters. 2. To diagnose motor vehicle engine breakdowns with the help control measurement and diagnostics means. 3. To check the engine water cooling system, fan functioning and replace engine water cooling system, replace cooling water. 4. To check the lubrication system, replace the oils. 5. To check the appropriacy of engine ignition system units and aggregates for exploitation, to strain or replace generator belt. 6. To dismount the engine out of the motor vehicle 7. To identify and eliminate breakdowns in engine cylinder block and cylinder heads. 8. To defect and repair or replace the main shaft-connecting rod mechanism parts. 9. To defect and repair or replace parts of gas distribution mechanism. 10. To perform the repair of spark plugs, ignition wires, distributor and induction coil in the engine ignition system. 11. To identify the defects of electric power sources, perform repair or replacement. 12. To identify ignition advance angle. To check contact, contact-breaker triggered system and to repair it. 	<p>1. Engine types, structure and functioning.</p> <p>2. Engine units and systems.</p> <p>3. Engine technical maintenance.</p> <p>4. Motor vehicle engine repair technology.</p> <p>4.1. Engine dismounting and preparation for repair.</p> <p>4.2. Engine dismantling and assembling methods and requirements.</p> <p>4.3. Removing, defectation and repair of engine cylinder block and cylinder head.</p> <p>4.4. Defectation and repair of the main shaft, choice and fitting of inserts.</p> <p>4.5. Defectation and repair of connecting rod–piston group, choice and fitting of pistons, cylinders and piston rings.</p> <p>4.6. Defectation and repair of gas distribution mechanisms, choice of inlet and exhaust valves, valve seating and regulating of the necessary thermal clearance.</p> <p>4.7. Delivery of the repaired engine to the location and testing with the help of various diagnostic measures and equipment.</p> <p>5. Repair technology of the motor vehicle ignition system.</p>	<p>Final examination</p> <p>360 hours</p>	

2.6. Diagnostics of the motor control system

Module objectives	Target group	Module outcomes	Module content	Form of assessment	Module range
<p>1. To find the symptoms of the motor control systems faults.</p> <p>2. To localise the faults of the motor control system using the computerised diagnostics measures.</p> <p>3. To implement the systemic diagnostics of the motor control systems :</p> <p>3.1. To execute the routine diagnostics</p> <p>3.2. To execute the integrated diagnostics of the motor control system using the digital diagnostics systems.</p> <p>3.3. To make a diagnostics referring to the instructions of producer.</p> <p>3.4. To make an experience based diagnostics.</p> <p>4. To define the resources for the diagnostics operations – materials, consumables etc..</p> <p>5. To settle the plan of the diagnostics operations.</p> <p>6. To check the validity of the diagnostics results, to verify the quality of the execution of diagnostics operations.</p> <p>7. To implement the correction measures into diagnostics operations.</p>	<p>Vocational school students, unemployed, training in market vocational training programmes, service workshop employees.</p>	<p>Module participants will acquire the following skills:</p> <ol style="list-style-type: none"> 1. To find the symptoms of the engine control system faults and localise the faults by consulting the customer, visual control, checking in action, using registering of signals with the different loadings of engine and turning speed, implementing digital systems of diagnostics. 2. To implement the systematic evaluation of the work of vehicle engine control system using the analysis of the diagrams of work characteristics, control of activators, evaluation of the fault memory contents, fault finding according to the regulations of producer, strategies and schedules of the diagnostics. 3. To analyse and evaluate the relations between the received results of the vehicle engine control diagnostics, which indicate the faults and damages of the system. 4. To analyse and evaluate the impact of the engine control system faults to the work of the vehicle and the environment. 5. To determine the resources of the diagnostics. 6. To schedule the diagnostics operations. 7. To assure the quality of engine control systems diagnostics operations. 8. To explain to the customer the parameters of his vehicle engine control system work, to comment the results of diagnostics and the impact of the detected faults to the work of vehicle and environment. 	<ol style="list-style-type: none"> 1. The types of engine control systems, composition of engine control systems. 2. Equipment of the engine control system diagnostics. 3. The technology of the engine control system diagnostics: routine diagnostics, integrated diagnostics, diagnostics according to the plans and regulations of the producers, experience based diagnostics. 4. Electric schemes and diagrams of the engine control system. 5. Instructions, schemes, plans and strategies of engine control system diagnostics issued by the producer. 6. The environmental impact of the work of engine control systems and its faults and environment protection requirements. 7. The planning and quality assurance in the engine control system diagnostics. 	<p>Final examination</p>	<p>360 hours</p>



**TRAINING MODULES:
CHASSIS, CAR MOTOR
AND TRANSMISSION
MECHANISM**

3.1. Training module: diagnostics and repair of the vehicle chassis

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
1. To meet and receive the customer	To listen to the claims and wishes of the customer regarding the technical state of his/her car	1. To identify the needs and wishes of the customer related to the general state of his/her car and to the functioning of the chassis	1.1. Principles of effective communication 1.2. Protection of the customer's property and the legal responsibility for its security	1.1. The customer's needs and wishes regarding the general technical state of his/her car are identified, customer's questions are answered 1.2. The security of the customer's car is assured
2. To evaluate the technical state of the chassis	Frame of chassis Axes Wheels - To make a visual control - To check with the instruments and equipment	2.1. To evaluate the technical state of the chassis mechanisms (frame, axes and wheels) according to the external treats and to detect the parameters of operation using tools and instruments of diagnostics.	2.1.1. Construction of the frame of chassis 2.1.2. Technical state characteristics of the chassis mechanisms referring to the producer's instructions and recommendations. 2.1.3. External treats of the faults and damages of the chassis mechanisms. 2.1.4. Functional parameters of the vehicle operation, tools and instruments of diagnostics. 2.1.5. Technology of diagnostics of chassis mechanisms (sequence of works).	2.1. The technical state of the frame of chassis is evaluated and the faults are identified 2.2. The technical state of the axes is evaluated and the faults are identified 2.3. The technical state of wheels is evaluated, the faults are identified
3. To explain to the customer the parameters of the technical state of chassis,		3.1. To communicate effectively with customers. 3.2. To provide the customer with the explanation	3.1. Principles of the effective communication. 3.2. Reasons of the vehicle chassis damages and faults and their possible consequences.	3.1. The parameters of the technical state of chassis are thoroughly explained to the customer, his questions are answered

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
to indicate the price and terms of repair works		act information about the detected faults and damages of chassis, as well as their repair methods, repair duration and prices.	3.3. Accounting of the consumables and labor costs, price calculation in the repairs of chassis mechanisms.	3.2. The information about the price and terms of repair works is provided to the customer, his wishes and demands regarding the price and terms are evaluated and reacted in a proper way.
4. To plan the sequence of the repair works of the chassis	<ul style="list-style-type: none"> - To foresee the stages of repair - To foresee the tools and equipment 	4.1. To know the technological sequence of chassis repair works	4.1. Technology of the chassis repair and the producers instructions of chassis assembling and disassembling.	4.1. The schedule of the chassis repair works is properly prepared 4.2. The tools and equipment of repair are selected in a proper way
5. To repair the chassis	The frame of chassis, axes, wheels : <ul style="list-style-type: none"> - To disassemble the units of chassis - To check the units of chassis for the faults - To replace the defected parts - To assemble the chassis 	5.1. To disassemble the units of chassis according to the producers instructions 5.2. To find the defected parts 5.3. To select the suitable parts and replace with them the defected parts 5.4. To assemble the units of the chassis according to the technical specifications of the producer	5.1. Technology of the disassembling and assembling of the chassis mechanisms 5.2. Defects of the vehicle mechanisms and their parts. 5.3. Fault finding methods, technical tools and instruments used in the fault finding of mechanisms and parts of chassis. 5.4. Theory of the fittings and tolerances, theoretical basis of the suitability for replacement and gathering the parts and mechanisms together. 5.5. The main methods of the repair of parts and mechanisms and their application.	5.1. The units of chassis are disassembled in a right way 5.2. The defected parts are identified 5.3. The parts for replacement are duly selected and the defected parts are replaced 5.4. The units of the chassis are assembled according to the technical specifications of the producer

6. To check the chassis after the repair and to test its technical state	6.1. To assemble, regulate, adjust and check the chassis mechanisms.	6.1. Technology of the assembling, regulating, adjusting and checking of the chassis mechanisms. 6.1.2 Technical specifications and instructions of the producer, other technological documents. 6.1.3. Quality control tools and their application.	6.1. The functioning of the assembled unit is controlled in the right way 6.2. The functioning of the chassis is evaluated referring to the technical specifications of exploitation
7. To return the repaired car to the customer, to proceed with the invoicing and payment for the executed services	7.1. To inform the customer about the executed works, used consumables, parts and their costs 7.2. To prepare the work accounting documents	7.1. Price calculation and accounting of the used materials, consumables, parts and executed works 7.2. Preparation of the primary accounting documents for the implemented repair works. 7.1.2. Principles of the effective communication	7.1. The customer is informed about the executed works and their costs, his questions are answered 7.2. The work accounting documents are prepared in a right way

Training / learning achievement evaluation schedule for the training module “vehicle chassis diagnostics and repair”

EVALUATION SPECIFICATIONS		WAYS OF EVALUATION				
		Test*	Observation of the group work	Individual practical tasks	Practical work in the workshops	Effective communication
1. The customers needs and wishes regarding the general technical state of his/her car are identified, customers questions are answered					+	+
2. The security of the customers car is assured						
3. The technical state of the frame of chassis is evaluated and the faults are identified		+	+	+	+	+

EVALUATION SPECIFICATIONS	WAYS OF EVALUATION				
	Test*	Observation of the group work	Individual practical tasks	Practical work in the work-shops	Effective communication
4. The technical state of the axis is evaluated and the faults are identified	+	+	+	+	+
5. The technical state of wheels is evaluated, the faults are identified.	+	+	+	+	+
6. The parameters of the technical state of chassis are thoroughly explained to the customer, his questions are answered.	+	+	+	+	+
7. The information about the price and terms of repair works is provided to the customer, his wishes and demands regarding the price and terms are evaluated and reacted in a proper way			+	+	+
8. The schedule of the chassis repair works is properly prepared	+		+	+	+
9. The tools and equipment of repair are selected in a proper way	+		+	+	
10. The units of chassis are disassembled in a right way		+	+	+	+
11. The defected parts are identified	+			+	
12. The parts for replacement are duly selected and the defected parts are replaced	+	+	+	+	
13. The units of the chassis are assembled according to the technical specifications of the producer	+		+	+	
14. The functioning of the assembled unit is controlled in the right way		+		+	
15. The functioning of the chassis is evaluated referring to the technical specifications of exploitation	+		+	+	
16. The customer is informed about the executed works and their costs, his questions are answered			+	+	+
17. The work accounting documents are prepared in a right way	+		+	+	

3.2. Project of module: diagnostics of car motor management system

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
<p>1. Technical requirements</p> <p>Principle steps:</p> <p>1.1. Detection of the symptoms of the motor management system functioning problems.</p> <p>1.2. Localisation of the faults.</p> <p>1.3. Accomplishment of the systematic assessment of the technical state of motor management system.</p> <p>- Execution of the routine diagnosis according to the vehicle manufacturer standards and using the computer-aided and expert-system-aided diagnostic systems.</p> <p>- Execution of the integrated diagnosis</p> <p>- Execution of the diagnosis according to the own experience and approaches based on the own experience of the executor.</p> <p>Other work methods:</p>	<p>Execution of the routine diagnosis – carrying through along with other tasks. It includes reading out and resetting the fault memories, setting of maintenance interval displays, routine sight controls, check of play etc.</p> <p>- Execution of the integrated diagnosis : adaptation of the characteristic diagrams, activation of the activators for testing, parametrical tasks, the evaluation of fault memory contents and overall assessment of the technical state of vehicle.</p> <p>- Execution of the diagnosis according to the vehicle manufacturer standards and using the computer-aided and expert-system-aided diagnostic systems.</p> <p>- Execution of the integrated diagnosis</p> <p>- Execution of the diagnosis according to the own experience and approaches based on the own experience of the executor.</p> <p>Other work methods:</p>	<p>1.1. To detect the symptoms of the motor management system functioning problems and to localize the faults using these measures:</p> <ul style="list-style-type: none"> - discussion with the customer, routine sight control - check of play, - registering the signals according to the load of the motor and rotation speed, - applying hi-tech diagnostics systems. <p>1.2. To accomplish the systematic assessment of the technical state of motor management system applying the following methods :</p> <ul style="list-style-type: none"> - adapting of the characteristic diagrams; - testing of the activators; - evaluating of the fault memory contents - trouble shooting carried through pre-set rules, flow plans and strategies of the manufacturer <p>1.3. To analyse and evaluate the interrelations between the received data on the symptoms of</p>	<p>1.1.1. Design of the motor management system.</p> <p>1.1.2. Technology of the routine diagnosis.</p> <p>1.1.3. Application of the high-tech diagnostics systems in the detection of symptoms and fault finding.</p> <p>1.2.1. Electric diagrams of the motor management system.</p> <p>1.2.2. Application of the computer aided and expert-system-based diagnostic systems.</p> <p>1.2.3. Instructions, rules, flow plans and strategies of the vehicle manufacturer.</p>	<p>1.1. The symptoms of the motor management system functioning problems are detected and the faults localised applying the mentioned measures.</p> <p>1.2. The systematic technical assessment of the motor management system technical state is accomplished applying the mentioned methods and measures of diagnostics.</p> <p>1.3. The interrelations of the received data on the symptoms of the motor management system functioning faults are analysed and conclusions elaborated.</p> <p>1.4. The impact of the motor management system faults to the</p>

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
<p>Work requirements</p> <p>factorer standards -Execution of the experience based diagnosis</p>	<p>discussion with the customer, visual control and checking by listening to the operation noises, measuring of the electricity supply characteristics, voltage and resistance (short circuit after the positive, short breaks in the supply of electricity); regulation based methods of diagnostics; fault simulation; simulation of the motor in operation</p>	<p>the functioning faults of the motor management system. 1.4. To detect and evaluate the impact of the faults of motor management system and its parts to the environment.</p>	<p>1.4. Impact of the motor vehicles to the environment, laws and regulations.</p>	<p>environment is analysed and the relevant results received.</p>
<p>2. Work process management requirements. 2.1. Identification of the resource needs: equipment, consumables. 2.2. Work planning: finding out the symptoms of the motor management, functioning problems, definition of the suitable process of the diagnosis, detection of the symptoms and fault finding, accomplishment of the</p>	<p>Contents Work management methods: Routine diagnosis – the diagnosis carried out along with repair and maintenance tasks. Integrated diagnosis – application of the different diagnosis methods for the different control units of motor management system and compilation of the diagnosis data.</p>	<p>2.1. To identify the needs of equipment and consumables in the motor management system diagnostics referring to the initial discussions with the customer and detection of the symptoms of faults. 2.2. To plan the operations of the diagnosis according to the requirements of the situation. 2.3. To monitor and check the</p>	<p>2.1. The technology of the motor management system diagnostics. 2.2. The planning of the diagnostics process. 2.3. Quality assurance</p>	<p>2.1. The needs of equipment and consumables in the motor management system diagnostics are identified. 2.2. The plan of the operations of the diagnostics according to the requirements of the situation is set up. 2.3. The quality of the diag-</p>

<p>systematic diagnosis, analysis of the diagnosis results, discussion of these results with the customer and transfer of these data to repair operation.</p> <p>2.3. Monitoring the quality of diagnostics operations by checking the validity of the diagnostics results and applying different diagnostics methods.</p> <p>2.4. Revision of the applied diagnostics methods and their validity, application of the corrective measures.</p>	<p>Diagnosis based on the technical rules requires the strict following of the pre-set rules and regulations.</p> <p>Experience based diagnosis is based on the development of the own diagnosis work-strategies and plans based on the experience of the executor.</p>	<p>quality of the diagnostics operations seeking to assure the validity of the received data: to use different methods of diagnostics for the detection of the same fault when needed, to repeat the operation of diagnostics when needed, etc.</p> <p>2.4. To revise the applied methods of diagnostics and their validity and to implement the corrective measures if needed.</p>	<p>ance in the diagnosis process.</p> <p>2.4. Team-working and individual work in the diagnosis of vehicles.</p>	<p>nostics operations is monitored, the validity of the received data is assured using different methods of diagnostics for the detection of the same fault when needed, repeating the operation of diagnostics when needed, etc.</p> <p>2.4. The applied methods of diagnostics and their validity are revised and the corrective measures are implemented.</p>
<p>3. Requirements of the communication relationships in the work process</p> <p>3.1. Communication with the customer.</p>	<p>- Listening to the wishes and problems of the customer related to the technical state of his/her car (and its motor management system)</p> <p>- Providing the customer with the information on the diagnosis results, explaining the reasons and the environmental impacts of the motor management systems faults.</p>	<p>3.1.1. To find out the needs and demands of the customer concerning the general functioning of his/her car and the functioning of the car motor in particular.</p> <p>3.1.2. Referring to the claims of the customer to define the suitable proceeding of the fault finding in the motor management system.</p> <p>3.1.3. To explain to the customer the technical parameters of the functioning of motor management system revealed in the diagnostics</p>	<p>3.1.1. Principles of the effective communication.</p> <p>3.1.2. Assuring the safety of the customers property and the legal responsibility for that. The technology of the motor management system diagnostics.</p> <p>3.1.3. The planning of the diagnosis process.</p>	<p>3.1.1. Customers needs and claims on the general technical state of his/her car and the functioning of the motor in particular are perceived, his/her questions are answered, customers property is secured and protected in the acceptable way.</p> <p>3.1.2. The relevant diagnostics process is planned.</p> <p>3.1.3. The technical parameters of the functioning of motor management system are thoroughly explained to the customer, his/her questions are answered,</p>

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
3.2. Communication with the colleagues in the work process.		process, to indicate the reasons of the faults, as well as the price and terms of the repair works. 3.2.1. To define and share the team-working tasks and roles in motor management system diagnostics. 3.2.2. To assure the transfer of the diagnosis data for the determination of the further steps	3.2.1. Principles of team-working. 3.2.2. Principles of effective communication at work.	the reasons of the faults are indicated and explained, the price and terms of the repair are indicated. 3.2.1. The team-working tasks and roles are defined and approved between the team members. 3.2.2. The diagnosis data is communicated and transferred for the determination of the further steps.
4. Requirements of the work safety and environmental responsibilities, work ethics 4.1. Fulfilling the work safety requirements. 4.2. Dissemination of the information on environmental demands and regulations of motor vehicle exploitation.	-Team-working and individual work in the motor management systems diagnosis. -Effective communication between diagnosis and repair specialists.	4.1. To assure the work safety in the diagnostics of motor management systems. 4.2. To inform the customer on the environmental impact of the faulty motor management	4.1.1. Safety requirements in the motor diagnostics works. 4.1.2. Safe exploitation of the diagnosis equipment and instruments. 4.2. Environmental regulations of motor vehicle exploitation.	4.1. The work safety requirements and norms in the diagnostics of motor management system are followed. 4.2. The environmental impact of the faulty motor management system is explained to the customer, the legal consequences of the violation of environmental regulations are indicated.

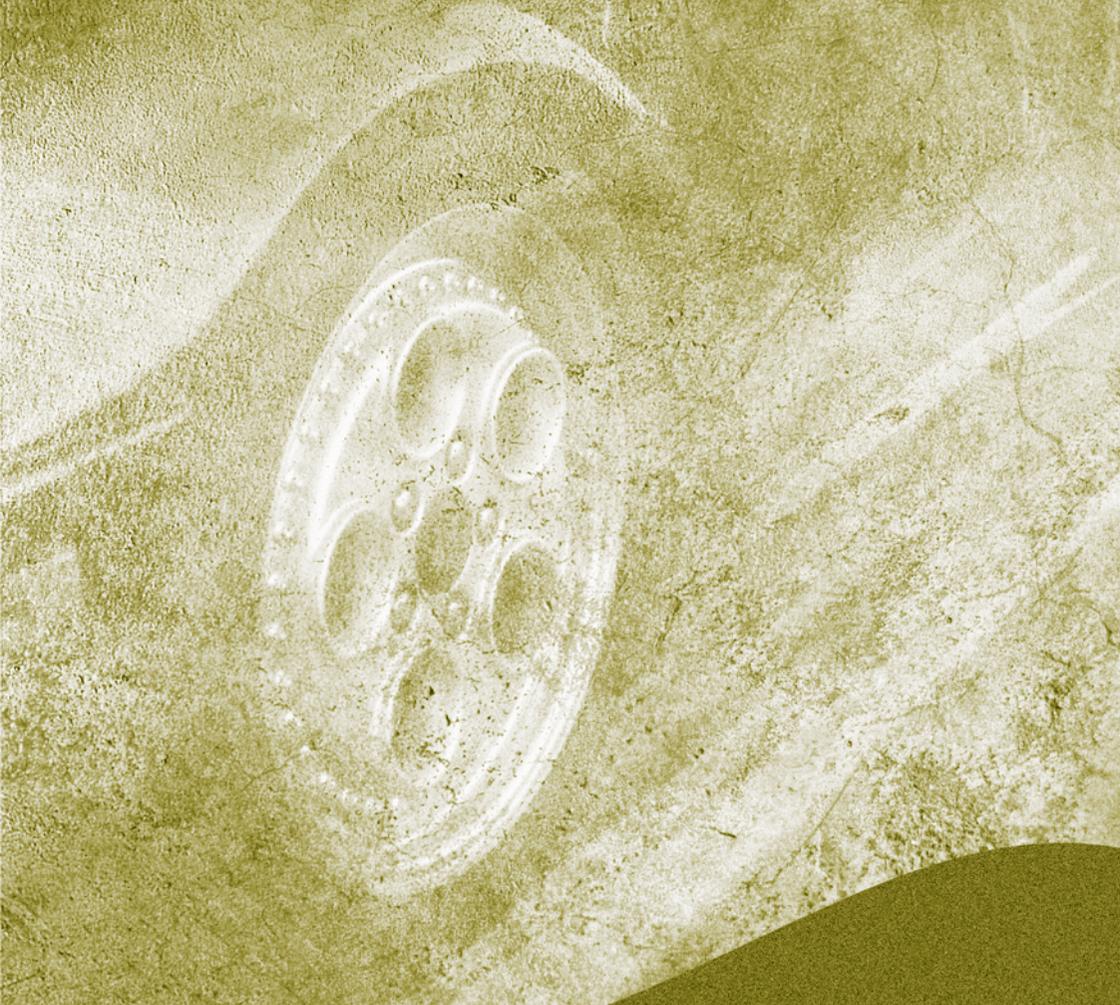
3.3. Training module: diagnostics and repair of the transmission mechanism

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
1. To meet and receive the customer	To listen to the claims and wishes of the customer regarding the technical state of his/her car and transmission in particular	1. To identify the needs and wishes of the customer related to the general state of his/her car and to the functioning of the transmission mechanism	1.1. Principles of effective communication 1.2. Protection of the customer's property and the legal responsibility for its security	1.1. The customer's needs and wishes regarding the general technical state of his/her car and the transmission mechanism in particular are identified, customer questions are answered 1.2. The security of the customer's car is assured
2. To evaluate the technical state of the transmission mechanism	Clutch Mechanical gearbox Automatic gearbox Wheel gears - To make a visual control - To check with the instruments and equipment	2.1. To evaluate the technical state of clutch 2.2. To evaluate technical state of the mechanical gear 2.3. To evaluate technical state of the automatic gear 2.4. To evaluate technical state of the wheel gear	2.1.1. Construction of the clutch 2.1.2. Tools and measures of diagnostics, technical and technological characteristics of clutch 2.2.1. Construction of the mechanical gearbox 2.2.2. Tools and measures of diagnostics, technical and technological characteristics of mechanical gearbox 2.3.1. Construction of the automatic gearbox 2.3.2. Tools and measures of diagnostics, technical and technological characteristics of automatic gearbox 2.4.1. Construction of the wheel gear 2.4.2. Tools and measures of diagnostics, technical and techno-	2.1. The technical state of the clutch is evaluated by visual control and with the use of instruments and the faults are identified 2.2. The technical state of the mechanical gearbox is evaluated by visual control and with the use of instruments and the faults are identified 2.3. The technical state of the automatic gearbox is evaluated with the use of instruments and the faults are identified 2.4. The technical state of the wheel gear is evaluated by visual control and with the

ACTIVITIES SPECIFICATIONS		LEARNING SPECIFICATIONS		EVALUATION SPECIFICATIONS
Work requirements	Scale	Learning aims	Fields of knowledge	Approval of competences
3. To explain to the customer the parameters of the technical state of vehicle transmission, to indicate the price and terms of repair works		3.1. To explain to the customer the parameters of the technical state of vehicle transmission 3.2. To provide the information about the prices and terms of the repair works	3.1. Technical state parameters of the vehicle transmission 3.2. Accounting of the consumables and labor costs, price calculation	3.1. The parameters of the technical state of vehicle transmission are thoroughly explained to the customer, his questions are answered 3.2. The information about the price and terms of repair works is provided to the customer, his wishes and demands regarding the price and terms are evaluated and reacted in a proper way.
4. To plan the sequence of the repair works of the vehicle transmission	- To foresee the stages of repair - To foresee the tools and equipment	4. To be able to plan the technological sequence of vehicle transmission repair works	4. Technology of the vehicle transmission repair	4.1. The schedule of the vehicle transmission repair works is prepared 4.2. The tools and equipment of repair are selected in a proper way
5. To repair the vehicle transmission	Clutch, mechanical gearbox, automatic gearbox, wheel gear - To disassemble the units of transmission	5.1. To disassemble the units of transmission 5.2. To find the defected parts 5.3. To select the suitable parts and replace with them the defected parts 5.4. To assemble the units of	5.1. Technology of the disassembling and assembling of the transmission 5.2.1. Fault finding methods 5.2.2. Fault finding measures 5.2.3. Sequence of the fault	5.1. The units of transmission are disassembled in a right way 5.2. The defected parts are identified 5.3. The parts for replacement are properly selected and the defected parts are replaced 5.4. The units of the transmis-

	- To check the units of transmission	the transmission according to the technical specifications of the producer	finding works 5.3. Parts of the transmission 5.4. Technology of the disassembling and assembling of the vehicle transmission	sion are assembled according to the technical specifications of the producer
6. To check the transmission after the repair and to test its technical state		6.1. To verify whether the repaired unit functions in accordance with the exploitation specifications issued by the producer	6.1.1. Measures and tools of diagnostics for transmission 6.1.2. Technical characteristics of the assembling units 6.1.3. Technology of diagnostics	6.1. The functioning of the repaired transmission is evaluated referring to the technical specifications of exploitation 6.2. Referring to the results of control the decision concerning the return of the repaired car to the customer or, in case of the repair works fault finding, the return of car to the repair is made
7. To return the repaired car to the customer, to proceed with the invoicing and payment for the executed services		7.1. To inform the customer about the executed works, used consumables, parts and their costs 7.2. To prepare the work accounting documents	7.1.1. Price calculation and accounting of the used materials, consumables, parts and executed works 7.1.2. Principles of the effective communication 7.1.3. Work accounting	7.1. The customer is informed about the executed works and their costs, his questions are answered 7.2. The work accounting documents are prepared in a right way





**METHODICAL MATERIAL
FOR THE MODULE “TECHNICAL
DIAGNOSTICS AND REPAIR OF
THE CHASSIS”**

4.1.Learning topics

1. TOPIC. Principles of efficient communication.

PURPOSE: To communicate with the customers in a polite and efficient way.

TASKS:

- To apply the acquired communication skills in practice;
- To communicate with people of different educational background applying cultural work and behaviour requirements in life and at work;
- To work in teams and make decisions to ensure work and ecological safety;
- To present precise and comprehensive information to the customer about the identified chassis faults and ways of their elimination, duration and service costs.

CONTENTS:

- Core skills concept;
- Methods for the development of core skills;
- Communication, principles and samples of practical usage;
- Work in teams;
- Application of computer programmes and means of information, providing information to the customer about service costs, duration and faults.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Demonstration;

Group work;

Individual work;

Practical skills training.



SUGGESTED RESOURCES

1. Literature:

- 1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
 - 1.2. Mokytojo knyga. Bendrieji gebėjimai. Jo Kirby, Vilma Žydzžiūnaitė, Romualda Trucienė, Birutė Sereikienė. Vilnius. 1999.
2. Practical tasks.
 3. Task sheets.

OUTCOME ASSESSMENT

Observation of the group work;

Group and individual work presentations, discussions.

2. TOPIC. Storage of the customer's property and legal responsibility.

PURPOSE: To ensure customer motor vehicle safety.

TASKS:

- To get acquainted with major laws of the Republic of Lithuania and its government decrees on the ownership;
- To explain to the customer the motor vehicle workshop commitment concerning the storage of the customer property;
- To describe legal responsibility for the customer property;
- To receive the motor vehicle, listen to the client's requests and ensure motor vehicle's safety;

CONTENTS:

- Job contract law;
- Laws of the Republic of Lithuania regulating legal responsibility for the customer property.
- Ways of ensuring motor vehicle security and opportunities in a concrete situation.



SUGGESTED TEACHING/LEARNING STRATEGIES

Explanations;

Practical group and individual work tasks.

SUGGESTED RESOURCES

1. Literature: Law on people's safety at work. A collection of normative acts, 2000.
2. Tasks for practical work.
3. Computer.

OUTCOME ASSESSMENT

Group work observation;

Group work presentation;

Discussion.

3. TOPIC. Suspension structure.

PURPOSE: To identify the systems of suspension mechanisms and parts.

TASKS:

- To name the types of suspension, its mechanisms and their parts;
- To find suspension mechanisms in a motor vehicle;
- To remember the peculiarities of suspension mechanisms and parts.

CONTENTS:

- Spring-loaded systems of a motor vehicle (springs, balancer).
- Dependent suspension;
- Independent suspension (spring suspension, shaft suspension , pneumatic suspension, hydro-pneumatic suspension);
- Advantages and disadvantages of suspensions of different kinds.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation, on the basis of the current learner knowledge;

Demonstration (of units);

Group work.

SUGGESTED RESOURCES

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Equipment: two column asymmetric lift, 3500 kg lifting power.

OUTCOME ASSESSMENT

- Responses to questions and tasks.

QUESTIONS AND TASKS

1. To identify the type of the presented motor vehicle spring-loaded suspension.
2. To name the peculiarities of spring-loaded suspension.
3. What is the purpose of the balancer?

4. TOPIC. Diagnostics equipment.

PURPOSE: To recognise suspension technical diagnostics equipment and use it properly and safely.

TASKS:

- To name suspension technical diagnostics equipment;
- To select and use suspension diagnostics equipment safely;
- To use technical measurement, diagnostics and quality assurance equipment properly.



CONTENTS:

- Measures of suspension diagnostics;
- Technical measurement, diagnostics and quality assurance equipment.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Demonstration;

Independent practical tasks;

Practical skill training.

SUGGESTED RESOURCES

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Practical tasks;
3. Measuring equipment;
4. Damper inspection stand.

OUTCOME ASSESSMENT

Practical work with damper inspection stand.

Responses to questions and tasks.

QUESTIONS AND TASKS

1. What kind of cylinder spring compression devices do you know?
2. When and how are leaf springs cleaned?
3. What measures of prevention are used in pneumatic suspension in winter?
4. Name the sequence of front wheel suspension spring replacement of the car AUDI 100.

5. TOPIC. Technology of suspension diagnostics.

PURPOSE: To identify the work parameters of suspension mechanisms and systems with the help of diagnostics equipment and repair them.

TASKS:

- To know the places of motor vehicle suspension technical maintenance and diagnostics inspection;
- To name the work parameters of motor vehicle suspension mechanisms and systems;
- To identify motor vehicle suspension faults, defects and causes;
- To be able to perform motor vehicle suspension diagnostics according to the technological sequence;
- To identify the quality of the performed work according to the parameters;
- To apply theoretical knowledge and skills in practical work;
- To notice and eliminate defects.

CONTENTS:

- Places of motor vehicle suspension technical maintenance and diagnostics inspection;
- Technology of motor vehicle suspension diagnostics and the work to be performed;
- Work parameters of motor vehicle suspension;
- Replacement of parts and units of bad quality.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Demonstration;

Work in groups;

Practical skill training in workshops.



SUGGESTED RESOURCES

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Measures of technical diagnostics;
3. Equipment: damper inspection stand.
4. Tools: a set of keys, measuring ruler.

OUTCOME ASSESSMENT

Group work and its presentation.

6. TOPIC. Technical characteristics of the suspension.

PURPOSE: to evaluate the technical state of motor vehicle suspension mechanisms and systems according to practical defined data and work parameters.

TASKS:

- To develop independent work skills;
- To apply theoretical knowledge in practice;
- To present technical characteristics of suspension systems and parts and apply them in practice.

CONTENTS:

- Technical characteristics of the suspension;
- Work parameters of motor vehicle suspension and systems;
- Faults, causes and effects of motor vehicle suspension.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Group work.

SUGGESTED RESOURCES

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Questions;
3. Equipment: damper inspection stand.

OUTCOME ASSESSMENT

Responses to questions;
Discussion.

QUESTIONS AND TASKS

1. Define the criteria for selecting motor vehicle suspension springs.
2. According to which features is the orderliness of the chassis evaluated in driving?
3. Which features indicate inappropriateness of the damper for further functioning?
4. Name the current and most peculiar faults in motor vehicle suspension mechanisms and systems.

7. TOPIC. Axle construction.

PURPOSE: To recognize motor vehicle axle mechanisms, systems and parts.

TASKS:

- To name the main axle construction;
- To be able to use speciality terms correctly;
- To define axle construction peculiarities;
- To identify types of axles in a practical activity.

CONTENTS:

- The construction of front axles;
- The construction of rear axles;



- Types of axles, their advantages and disadvantages.

SUGGESTED TEACHING/LEARNING STRATEGIES.

Explanation;

Group work.

SUGGESTED RESOURCES

1. Literature: Automobilių (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Equipment: two column asymmetric lift of 3500 kg lifting power.

OUTCOME ASSESSMENT

Independent, practical tasks;

Responses to questions.

QUESTIONS

1. Name various structure of solid axles;
2. Explain the concept “solid axle” and name the areas of usage of this axle.
3. What are the advantages and disadvantages of solid axle structures?

8. TOPIC. Measures of axle diagnostics.

PURPOSE: To recognize axle diagnostics measures and use them properly and safely.

TASKS:

- To name axle diagnostics measures;
- To choose and apply technical measuring diagnostics and quality control equipment;
- To use axle diagnostics measures safely in practical activity.

CONTENTS:

- Measures of motor vehicle axle diagnostics;
- Motor vehicle wheel angle fixing stand, its practical usage;
- Lift for wheel adjustment, its technical characteristics and practical application possibilities.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Demonstration;

Independent work;

Practical skill training in workshops.

SUGGESTED RESOURCES

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Independent work tasks.
3. Measuring equipment.
4. Equipment:
 - 4.1. Wheel regulating stand for cars and its accessories.
 - 4.2. Lift for wheel regulating.

OUTCOME ASSESSMENT

Performance and presentation of independent practical tasks.

9. TOPIC. Technology of axle diagnostics.

PURPOSE: To identify the work parameters of motor vehicle axle mechanisms using technical diagnostic measures and, if it is necessary, to replace them.



TASKS:

- To recognize the peculiar places of motor vehicle axle mechanism diagnostics;
- To practically diagnose axle mechanism faults according to the work sequence;
- To select axle diagnostics measures;
- To follow work safety requirements.

CONTENTS:

- Places of motor vehicle axle mechanism diagnostics;
- Diagnostics measures and their selection;
- Work with diagnostic measures;
- Fault finding and ways of their replacement and repair.

SUGGESTED TEACHING/LEARNING STRATEGIES

Demonstration;

Group work;

Practical skill training in workshops.

SUGGESTED RESOURCES

1. Literature: Automobilių (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
2. Group work tasks.
3. Measuring devices.
4. Equipment:
 - 4.1. Car wheel regulating stand and accessories.
 - 4.2. Lift for wheel regulating.

OUTCOME ASSESSMENT

Group work observation and discussion.

Discussions.

10. TOPIC. Technical characteristics of axles.

PURPOSE: Name axle technical characteristics according to the given parameters.

TASKS:

- To know the most peculiar axle technical characteristics;
- To evaluate motor vehicle technical state according to the technical characteristics.

CONTENTS:

- Axle technical characteristic;
- Evaluation of axle diagnostic data according to the parameters;
- Axle technical maintenance according to the obtained diagnostic parameters.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Demonstration;

Group work.

SUGGESTED RESOURCES:

1. Literature: Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.

OUTCOME ASSESSMENT

Group work observation and discussion.

Discussions.

11 TOPIC. Wheel construction.

PURPOSE: To identify the parts of motor vehicle structure.



TASKS:

- To name the main types of wheels;
- To know the types of wheel rims and distinguish them in practice;
- To fix wheels in practice;
- To select the necessary tyre for the motor vehicle in practice;

CONTENTS:

- Types of wheels (disk wheels, wheels with spikes);
- Wheel fixing;
- Wheel rims, their function and types;
- Tyres, their structure and types.

SUGGESTED TEACHING/EARNING STRATEGIES

Explanation;

Demonstration;

Group work;

Practical skill training in workshops.

SUGGESTED RESOURCES:

1. Literature.

1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.

1.2. Mano automobilis. Kazimieras Giebra, Algimantas Valatka. Kaunas. Tyrai. 2002.

2. Equipment: two column asymmetric lift of 3500 kg lifting power.

OUTCOME ASSESSMENT

Responses to questions;

Practical fixing of wheels;

QUESTIONS AND TASKS

1. Name the components of wheels and define their functions.
2. What are the advantages of wire spoke wheels?
3. What is the reason for producing solid wheel rims with well-base surface?
4. What is the difference between cross-shoulder wheel rim and wheel rim with the large perpendicular shoulder? Show this in practice.
5. Show a wheel rim protecting shoulder and describe it (comment).

12. TOPIC. Wheel diagnostics devices.

PURPOSE: To recognize the devices of wheel diagnostics and use them properly and safely.

TASKS:

- To name the devices of wheel diagnostics;
- To select the devices of wheel diagnostics and use safely;
- To use the equipment of diagnostics and quality assurance properly.

CONTENTS:

- Wheel mounting and balancing equipment;
- Work safety requirements working with diagnostic devices.

SUGGESTED TEACHING AND LEARNING STRATEGIES:

Explanation;

Demonstration;

Group work;

Practical skill training in workshops.



SUGGESTED RECOURSES

1. Literature:

- 1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
- 1.2. L. Jonaitis. Mašinų servisas. Kaunas. Smaltija. 1998.

2. Equipment:

- 2.1. Equipment: two column asymmetric lift of 3500 kg lifting power.
- 2.2. Car balancing and mounting stand.

3. Tools: tyre repair tools and devices.

OUTCOME ASSESSMENT

Group work observation;

Independent practical tasks;

Development of practical tasks in workshops.

13. TOPIC. Wheel diagnostics and technology.

PURPOSE: To identify motor vehicle work parameters with the use of technical diagnostics devices.

TASKS:

- To know the places of motor vehicle wheel technical maintenance and diagnostic inspection;
- To name the parameters diagnostics;
- To perform wheel diagnostics according to the technological sequence;
- To identify the quality of the performed work and turn the work in.

CONTENTS:

- Technical maintenance and diagnostics of motor vehicle wheels;
- Technology of motor vehicle wheel diagnostics and the activities to be performed;
- Replacement of parts or elements that are of inadequate quality.

SUGGESTED TEACHING/LEARNING STRATEGIES:

- Explanation;
- Demonstration;
- Group work;
- Practical skill training in workshops.

SUGGESTED RESOURCES

1. Literature:

- 1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
- 1.2. A. Butkus. Autoservisas garaže. Valstybinė enciklopedijų leidykla. Vilnius. 1992.
- 1.3. L. Jonaitis, K.R. Jonaitis. Automobilių techninio aptarnavimo laboratoriniai darbai. V. Mokslas. 1991.

OUTCOME ASSESSMENT

- Group work observation;
- Consideration;
- Discussion;
- Responses to questions.

QUESTIONS

1. Name the main possible wheel defects.
2. What ways of motor vehicle wheel camber alignment (of the chosen desirable mark) do you know?
3. What tyre types require the use of wheel rim with hump form bent?
4. Instead of tyre 205/65R1594 V, tyre 205/55R 1591 V was mounted. What is the effect of this change?
5. Explain the difference between the static and dynamic balancing.
6. Describe the characteristic tyre faults and their causes.
7. What maintenance peculiarities are valid for the tyre marked as ŽR?



14 TOPIC. Technical characteristics of wheels.

PURPOSE: name the technical characteristics of wheels and evaluate the state of wheels according to the obtained data.

TASKS:

- To know the most peculiar technical characteristics of wheels;
- To evaluate technical state of wheels;
- To perform technical maintenance of wheels according to the obtained diagnostic data.

CONTENTS:

- Technical characteristics of wheels;
- Identification of the technical state of wheels according to the technical characteristics.

SUGGESTED TEACHING/LEARNING STRATEGIES:

Explanation;

Demonstration;

Group work, its presentation and discussion.

SUGGESTED RESOURCES

1. Literature:

- 1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
- 1.2. A.Butkus. Autoservisas garaže. Valstybinė enciklopedijų leidykla. Vilnius. 1992.
- 1.3. L.Jonatis. Mašinių servisas. Kaunas, Smaltija, 1998.

2. Equipment:

- 2.1. Two column asymmetric lift of 3500 kg lifting power.
- 2.2. Wheel balancing and mounting stand.

OUTCOME ASSESSMENT

Responses to questions, a task;

Discussion,

QUESTIONS AND TASKS:

1. What is the impact of air pressure in tyres upon motor vehicle performance?
2. Why is the motor vehicle “drawn” to the right while running?
3. What is the meaning of this tyre marking P61M+S175/70 R 13 steel 82S?
4. Show a wheel rim and write down or tell the major marking signs.
5. Explain what kind of information is coded in these wheel rim marking signs: 6JX14 H2 and 6X17,5 ?
6. Name the requirements for tyres.
7. What is the difference between a radial-ply tyre and cross-ply tyre?
8. What data are presented for tyre identification?
9. What is the difference between the 65th tyre and 50th, if the width of both the tyres is equal?
10. How do you understand the concept “beam angle” ?

15 TOPIC. Chassis repair technology.

PURPOSE: To carry out practical chassis repair work according to the technology.

TASKS:

- To explain chassis dismantling and assembling technology and apply it practically (use);
- To identify defect identification measures and perform defect identification work according to the work sequence (technology)
- To select proper chassis parts and replace them;



- To assemble chassis units according to the manufacture technical requirements

CONTENTS:

- Dismantling technology of chassis units and parts;
- Identification of defects of chassis units and parts and measures of use;
- Selection and replacement of new parts and units (instead of the fault parts and units).
- Assembling of the chassis units and determination of the performed work quality.

SUGGESTED TEACHING/LEARNING STRATEGIES:

Explanation;

Demonstration;

Group work, its presentation and discussion.

SUGGESTED RESOURCES

1. Literature:

- 1.1. Automobiliai (Vadovėlis techninių specialybių studentams, vertė Aleksandras Kirka). Kaunas. Tyrai. 2001.
- 1.2. A. Butkus. Autoservisas gara • e. Valstybinė enciklopedijų leidykla. Vilnius. 1992.
- 1.3. L. Jonaitis. Mašinių servisas. Kaunas. Smaltija. 1998.
- 1.4. L. Jonaitis. Mašinių priežiūra. Vilnius. Mokslas. 2000.

2. Equipment:

- 2.1. Car wheel alignment stand and accessories;
- 2.2. Lift for wheel alignment;
- 2.3. Hydraulic press.

3. Tools:

- 3.1. Damper replacement tools for cars and micro buses (K 70; K 101; K 40)
- 3.2. Spring tightening tool;
- 3.3. Pneumatic screwdriver.



OUTCOME ASSESSMENT

Delivery of the work, performed in a qualitative way and group work observation.

16. TOPIC. Record of the used consumables, parts and performed work activities.

PURPOSE: To create initial record documents for the performed work activities and present the information to the customer about the performed work and its costs.

TASKS:

- To know about the storage of consumables, units and parts necessary for the chassis technical state diagnostics and repair, to know the requirements for their record;
- To remember the principles of efficient communication with the customers;
- To keep records of the performed work and used consumables, parts and units.

CONTENTS:

- Storage and record keeping of used consumables, parts and units;
- Creation of initial record documentation of performed chassis technical state diagnostic and repair work, used consumables, parts and units;
- Presentation of the information about the performed work and its costs to the customer.

SUGGESTED TEACHING/LEARNING STRATEGIES

Explanation;

Group work;

Performance of individual practical tasks (filling in the report documents and used material blank forms).



SUGGESTED RESOURCES:

1. Catalogues of the chassis parts and units according to motor vehicle marks.
2. Tariffs of the performed work (applied in motor vehicle workshops having introduced the coefficient for the student's performed work).
3. Blank forms of accounts and orders.

OUTCOME ASSESSMENT

Group work observation;

Filling in blank forms of accounts and orders and delivery.

ASSESSMENT

Learner knowledge and skills are assessed using formal evaluation methods. It is suggested to evaluate during the module and perform summative evaluation having completed the module. Practical task, independent work, discussion, questionnaire methods are recommended for assessment in the learning process. Having completed the module, a learner has to perform Test 1.

TEACHING AND LEARNING OUTCOMES.

Having listened and practically tested the practical tasks presented in the module topics and after Test 1, the learners will be able to:

1. To select motor vehicle chassis diagnostics measures and use them safely.
2. To communicate with customers successfully, work in teams, receive orders, identify prices for services, ensure the storage of the customer's property.
3. To perform chassis diagnostics and repair, i.e. to identify chassis faults, to replace improper units and parts.

CORE SKILLS AND ABILITIES

The development of core skills is one of the most important tasks today while teaching and learning the module “Diagnostics and repair of chassis technical state”. During this module communication skills, work with others, native language culture, computer literacy, cooperative work and problem solving skills are developed.

MODULE MAINTENANCE AND EVALUATION.

Having completed the module, it is necessary to overview it, as the teaching methods and assessment can change, new diagnostic equipment can appear or new students can come to learn.

During the overview, it is recommended to take into account the remarks and suggestions provided by the learner who has completed the module, the trainer, customer or employer.



4.2. Evaluation test

MODULE “DIAGNOSTICS AND REPAIR OF THE CHASSIS TECHNICAL STATE“ TEST 1

Circle the right answer or mark with an X.

1. Axles, wheels, and dampers are the constituent parts of:

1. transmission;
2. chassis;
3. control equipment;
4. engine.

2. Chassis suspension elements include:

1. steering linkage, front axle;
2. differential, wheels;
3. dampers, springs;
4. brake disks, wheel hubs.

3. In order to evaluate the technical state of suspension it is necessary to inspect:

1. springs, dampers;
2. wheels, wheel bearings, tyres;
3. cardan shaft, differential, final drive;
4. steering wheel free movement, steering wheel reduction gearbox, and steering wheel rods.

4. What is the reason for the difference in measuring motor vehicle body from the wing to the bottom of the wheel rim on the left and the right sides?

1. the damper is broken;
2. air pressure in the tyre is too low;
3. wheel alignment is improper;
4. suspension spring is broken.

5. What can be identified by pressing the motor vehicle slightly down?

1. steering wheel free movement;
2. unbalance of the wheels;
3. function failure in dampers;
4. air pressure in the tyres.

6. Is the suspension called independent when each wheel at the axle beam or body is connected separately?

1. no;
2. yes;
3. yes, dampers are gas dampers;
4. no, if tyres are wide.

7. What is tested by diagnostics of motor vehicle axles?

1. brake efficiency;
2. axle position and wheel alignment angles;
3. wheel state;
4. steering wheel free movement.

8. Why is the motor vehicle turn radius to the left and to the right uneven?

1. because of the distance between front and rear wheels in the left and in the right is different;
2. because the front and rear axle distance between the wheels is different;
3. because of improper wheel camber;
4. because of steering wheel linkage free movement.

9. Why is there a tendency for the motor vehicle to “draw” to the right?

1. because of the independent suspension;
2. improper wheel camber;
3. broken damper;
4. broken anti-roll bar.



10. When is it necessary to align wheel steering angle?

1. having checked steering wheel rod ball joints
2. having supercharged a tyre;
3. having replaced wheel bearing;
4. having replaced steering wheel rod ball joints.

11. Why do the external sides of the both front tyres wear more?

1. because of the tyre faults;
2. because of the wrong chassis axle position;
3. because of too small wheel alignment;
4. because of too big wheel alignment.

12. Why do motor vehicle wheels start “to beat” and bounce when the motor vehicle speed increases?

1. because of the fault in engine mechanism;
2. because of improper wheel alignment;
3. because of the damaged suspension spring;
4. because of the wheel unbalance.

13. What happens if the air pressure in the tyre is low?

1. the middle of the tyre wears more;
2. the sides of the tyre wear more;
3. the tyre wears evenly;
4. the tyre wears differently.

14. What does the marking 185/70 R14 mean?

1. the most permissible tyre speed;
2. the width of the tyre, ration of the cross-section, type of the tyre, diameter of the wheel rim;
3. permissible tyre load;
4. the tyre is universal.

15. When is it necessary to balance the wheel?

1. having supercharged air;
2. twice a year;
3. having replaced the tyre;
4. having replaced wheel bearings.

16. What is used for measuring the air in tyres?

1. manometer;
2. tachometer;
3. dynamometer;
4. speedometer.

17. What should be identified before mounting a tyre?

1. tyre manufacturer;
2. tyre turning direction;
3. type of the tyre;
4. the year of making a tyre.

18. What is it necessary to do when motor vehicle suspension spring is damaged?

1. to stretch the spring up to the necessary size;
2. to weld the spring;
3. to replace the tyre with a proper one;
4. it is possible to run a motor vehicle without any changes.

19. What is to be done if one motor vehicle tyre is unfit? It is necessary

1. to renew it;
2. to align it;
3. to replace it;
4. it is possible to run a car without any changes.



CONGRATULATIONS! YOU HAVE COMPLETED THE CHASSIS MODULE PROGRAMME SUCCESSFULLY.

Evaluation:

Each test question is worth 0,5 points.

Wrong answer - 0 points.

Summative evaluation, total mark up to 10.

In case of 0.5 point in the total sum, 0.5 point is added in favour of the learner.

The lowest positive evaluation mark is 4.

Test was performed by:

Group _____

First name, surname _____

Date _____ Signature _____

Answers were evaluated by _____

Evaluation of the learner responses _____

Remarks:



