



Australian Government

Department of Education, Employment and Workplace Relations

AURM542103A Apply aerodynamic and vehicle dynamic principles and effects to competition vehicles

Release: 1

AURM542103A Apply aerodynamic and vehicle dynamic principles and effects to competition vehicles

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency covers the skills and knowledge required to determine aerodynamic and vehicle dynamic requirements of competition vehicles, devise improvement strategies, apply changes and test results
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Application of the Unit

Application of the unit	This unit includes terminology, principles and effects of the physics involved in resistance and motion. Work requires individuals to demonstrate analytical and organisational ability, judgement and problem-solving skills in the application of aerodynamic and vehicle dynamic principles and effects to competition vehicles
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
	AURM441868B	Select and prepare tyres and wheels for motorsport applications
	AURM441749B	Prepare competition vehicle suspension
	MEM30012A	Apply mathematical techniques in a manufacturing, engineering

Prerequisite units		
		or related environment

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Determine optimum tyre setting	1.1. Controlling body rules, category rules, supplementary regulations, manufacturer/component supplier specifications and team requirements are used to identify setting requirements 1.2. Regulations and specifications/tolerances are examined to determine competitive advantage (technical, psychological and/or promotional advantage) 1.3. Occupational health and safety (OHS) requirements, including regulatory requirements and personal protection needs, are observed throughout the work 1.4. Specifications are checked for required operating conditions and clarification of specifications is sought where required 1.5. Tyre setting requirements are calculated/determined according to known factors 1.6. The effects of selected tyre settings on overall vehicle performance are evaluated 1.7. Anticipated performance improvement is quantified and optimum settings are documented
2. Determine optimum steering and suspension settings	2.1. Controlling body and category rules, supplementary regulations, component supplier specifications and team requirements are used to establish settings 2.2. Regulations and specifications/tolerances are examined to determine competitive advantage (technical, psychological and/or promotional advantage) 2.3. Specifications are checked for required operating conditions and clarification of specifications is sought where required 2.4. Steering and suspension setting requirements are calculated/determined according to known factors 2.5. The effects of selected steering and suspension settings on overall vehicle performance are evaluated 2.6. Anticipated performance improvement is quantified and optimum settings are documented
3. Determine optimum aerodynamic device settings	3.1. Controlling body rules, category rules, supplementary regulations, component supplier specifications and team requirements are used to establish settings 3.2. Regulations and specifications/tolerances are examined for competitive advantage (technical, psychological and/or promotional advantage)

ELEMENT	PERFORMANCE CRITERIA
	3.3. Specifications are checked for required operating conditions and clarification of specifications is sought where required 3.4. Aerodynamic device setting requirements are calculated/determined according to known factors 3.5. The effects of selected aerodynamic device settings on overall vehicle performance are evaluated 3.6. Anticipated performance improvement is quantified and optimum settings are documented

ELEMENT	PERFORMANCE CRITERIA
4. Supervise the configuration of aerodynamic and vehicle dynamic settings	4.1. Tooling and equipment are checked for safe and effective operation 4.2. The configuration of aerodynamic and vehicle dynamic settings is supervised 4.3. During and after configuration, checks are made to ensure accurate and complete changes 4.4. Problems with the work area or the operation of equipment are evaluated and decisions implemented 4.5. Proposals for modifications or adaptation of equipment/components are evaluated and implemented 4.6. Work area cleanliness and layout for job requirements is monitored
5. Test aerodynamic and vehicle dynamic settings	5.1. Test procedures are determined 5.2. Settings are tested against anticipated performance improvement 5.3. Testing procedure and results are documented 5.4. Recommendations for settings usage are devised and implemented

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- research, collect, organise and understand information related to the application of aerodynamic and vehicle dynamic principles and effects to competition vehicles, including the technical, regulatory, environmental and safety requirements
- communicate ideas and information to enable clarification of requirements, coordination of work with supervisors and other workers and the reporting of work outcomes and problems
- plan and organise activities including the preparation and layout of the work area and the coordination of equipment, systems and material to avoid backtracking, workflow interruptions or wastage
- work with others to foster the team by recognising dependencies and using cooperative approaches to optimise workflow and productivity
- use mathematical ideas and techniques to correctly complete measurements and calculations required during the application of aerodynamic and vehicle dynamic

REQUIRED SKILLS AND KNOWLEDGE

principles and effects to competition vehicles

- create and apply systematic problem-solving techniques to anticipate problems, avoid reworking and avoid wastage
- use workplace technology related to determining requirements for the application of aerodynamic and vehicle dynamic principles and effects to competition vehicles including tooling, measuring devices, equipment, calculators and computers

Required knowledge

Required knowledge includes:

- controlling body rules, category rules and supplementary regulations relating to establishing settings
- terminology, principles and effects of the physics involved in resistance and motion
- manufacturer/component supplier specifications and team instructions relating to establishing settings
- aerodynamic and vehicle dynamic principles and their effects on competition vehicles
- competition vehicle test methods and procedures, including record keeping methods
- mathematical computations to determine optimum settings
- team guidelines regarding acceptable tolerance levels
- OHS policies and procedures

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently:

- interpret and apply team requirements, controlling body and category rules and supplementary regulations
- apply safety requirements, including the use of personal protective equipment
- follow task instructions, operating procedures and inspection processes to:
 - minimise the risk of injury to self or others
 - prevent damage to competition vehicle or equipment
 - achieve required outcomes within team time and quality standards
- correctly determine and supervise the configuration of optimum aerodynamic and vehicle dynamic settings on a minimum of two (2) occasions. Each of the following must be covered:
 - tyre settings
 - steering and suspension settings
 - aerodynamic device settings
- select and correctly conduct test procedures
- document test results and compare to anticipated performance improvements
- manage time efficiently
- work effectively with others
- modify activities to cater for variations in workplace context and environment.

Context of, and specific resources for assessment

- Assessment may occur on the job or in a workplace simulated facility with process equipment, material, work instructions and deadlines.
- Assessment of this competence may include project-related tasks and require portfolios or other forms of indirect evidence of process.
- Direct evidence will include endorsement of final outcome/product by team management or authorisation

EVIDENCE GUIDE

	for use by a competent authority. • Access to competition vehicles and associated assembly tooling in real or simulated situations involving the application of repair/modification techniques and the related computing, operational and inventory support systems. • Access to real or simulated work areas, material, equipment and information on work specifications, team requirements, organisational procedures, safety procedures and regulations, and quality standards.
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EVIDENCE GUIDE	
Method of assessment	- Assessment methods must confirm consistency of performance over time and in a range of workplace contexts. - Assessment should be by direct observation of tasks and questioning on underpinning knowledge. - Assessment should be conducted over time and may be in conjunction with assessment of other units of competency. - Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.
Guidance information for assessment	

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
OHS requirements	OHS requirements include: - state/territory and federal legislation, - material safety management systems - controlling body requirements - manufacturer specifications and local safe operating procedures
Legislative requirements	Work is carried out in accordance with legislative obligations (including environmental requirements), health regulations, manual handling procedures and team insurance requirements
Tyre settings	Tyre settings include, but are not limited to: - construction and compound - size (including stagger)

RANGE STATEMENT	
	• pressures • loadings • temperatures

RANGE STATEMENT	
Steering and suspension settings	Steering and suspension settings include, but are not limited to: • wheel rate and linkage/leverage ratios • spring rate and spring pre-load • vehicle weight, sprung and unsprung weight • anti-roll bar rate (where fitted) • steering angles including toe-in/out, camber and caster • roll centres • ride height • centre of gravity
Aerodynamic settings	Aerodynamic settings include, but are not limited to: • wing angles, height and location • body panels and fittings • ground effects/ride height • frontal areas • lift reduction/drag reduction • downforce generation • downforce/drag compromise
Known factors for determining suspension requirements	Known factors for determining suspension requirements include, but are not limited to: • regulatory constraints • budgetary constraints • load and speed characteristics • terrain and climate conditions • driver/rider preferences
Tooling and equipment	Tooling and equipment must include component supplier specified tooling and may include, but is not limited to: • jacking equipment • measuring devices • tyre pressure and temperature gauges • hand tooling • calculators, computers and data acquisition systems
Personal protective equipment	Personal protective equipment is to include that prescribed under legislation, regulations and team

RANGE STATEMENT	
	policies and practices
Information/documents	Information/documents may include: - controlling body rules, category rules and supplementary regulations - team procedures relating to applying aerodynamic and vehicle dynamic principles and effects to competition vehicles - task instructions, including worksheets, checklists, plans, drawings and designs - team procedures relating to reporting and communication - team procedures relating to the use of tooling and equipment - manufacturer/component supplier specifications and application procedures for test equipment and material - Australian Design Rules (where applicable) - motorsport/performance enhancement industry publications related to aerodynamic and vehicle dynamic principles

Unit Sector(s)

Unit sector	Motorsport
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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