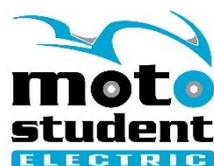


# V International Competition MotoStudent

2017 - 2018



## Competition Regulations

Ref.01.2017

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## **V International Competition MotoStudent**

### **SECTION A: ADMINISTRATIVE REGULATIONS**

## ARTICLE 1: INTRODUCTION TO MOTOSTUDENT COMPETITION

### A.1.1 Event Promoter

The MotoStudent competition, promoted by the Moto Engineering Foundation (hereinafter MEF) and TechnoPark Motorland, is an academic challenge between teams from different universities around the world.

### A.1.2 MotoStudent Objectives

A.1.2.1 The Motostudent Competition is a multidisciplinary university challenge that allows students to develop a real industrial project in the motorsport sector. The participating students have to design and develop a racing motorbike project (electric or petrol) which will be evaluated and tested in a Final Event to be held at the MotorLand Aragón facilities in Alcañiz (Teruel), Spain.

A.1.2.2 The competition itself is a challenge to the students. During a period of three semesters, they will have to put their creativity and innovation capacity to the test, showing their abilities as future engineers or specialized technicians, against those of other teams from all around the world.

A.1.2.3 MotoStudent allows the teams maximum flexibility for the design, with few restrictions as regards the "decision making" for the overall design of the motorcycle. Therefore, the vehicles or projects taking part in the competition shall fulfil certain minimum requirements in terms of safety and dimensions in specific areas.

A.1.2.4 The challenge for the teams is to develop a motorcycle that will successfully pass all trials and tests during the MotoStudent Competition. MotoStudent gives the teams the chance to show and put their talents to the test in terms of engineering, creativity and business abilities, competing against other universities from all around the world.

A.1.2.5 Each project will be evaluated through different phases and scoring tests, to determine the projects and prototypes that stand out in the different areas.

### A.1.3 Entries

The MotoStudent Organization has established an open entry policy and accepts entries from student teams representing universities from all over the world..

A.1.3.1 The Registration period starts on December 28, 2016 and ends on April 30, 2017. The Registration process shall be formalized through the website of the Competition: [www.motostudent.com](http://www.motostudent.com).

A.1.3.2 The entry fee for a team amounts to €2,525 + VAT (value added tax). This fee covers the entry of the 7 compulsory team members. Each additional team member must pay an additional fee of €260 + VAT (value added tax).

A.1.3.3 To consider a team as registered, it will be necessary to have paid the corresponding entry fees. The entry fees must be paid to the MotoStudent Organisation not later than the due date stated on the respective invoice. If the payment date is delayed, the team could have certain handicaps, such as delayed reception of its MotoStudent Kit.

A.1.3.4 The number of available places for teams is limited in both categories. These vacancies will be covered by order of registration (including the payment of the registration fee). Teams that have not paid the registration fees will not be considered as complete registered, therefore it will not be possible to reserve the place for the competition.

A.1.3.5 The payment of the registration fee includes:

- The rights to participate at the V Edition of the International Competition MotoStudent as an official team, with the consequent certificate of recognition for the participating students and Faculty advisors.
- The "full access" passes and corresponding insurance for the Final Event in 2018 for the registered team members..
- The MotoStudent Kit that includes common compulsory parts for all teams that must be installed in the bike. The shipping cost of the Kit is also included. There are not included the duties or special taxes of the destination countries, states or other zones.
- The right to access to discounts in services, training, job exchange, parts and opportunities offered by the Competition Organization and sponsor companies.

A.1.3.6 The entry fees at the Competition are not refundable. If for any cause external to the Organization, the Competition is disrupted, canceled, or is determined a variation in the time scheduled (for example on the dates of the Final Event), the Organization reserves the right to not refund the amount of the registration fee.

#### **A.1.4 Official publications and Event information**

All official communications, Regulations, appendices, etc. will be published on the official website of the Competition: [www.motostudent.com](http://www.motostudent.com)

A.1.4.1 All teams must read and become familiar with all the publications on the MotoStudent website.

A.1.4.2 The Organization may use the email system or other electronic means to send news and information about the Competition. To do this, each team will present two official email addresses to receive communications:

- Faculty Advisor email address
- Team or Team leader email address

#### **A.1.5 Official languages**

The Official languages of the Competition will be the following (in order of priority):

1º English

2º Spanish

A.1.5.1 Official publications and documents will be presented in English. The Organization will also try to publish such documentation in Spanish, although it reserves the right not to do so if it deems it convenient.

A.1.5.2 The communications between the participating teams and the Organization must be made in one of the two official languages indicated at Art. A.1.5 The Organization does not guarantee the possibility of attending questions addressed in other languages.

- A.1.5.3 In the event of any conflict between the English version of the Regulations and its Spanish version, it will be the English version which will prevail. This rule will apply to any official document published by the Organization throughout the Competition.

## **ARTICLE 2: MOTOSTUDENT REGULATIONS AND ORGANIZATION**

### **A.2.1 Rules of the Organization**

The Regulations of the MotoStudent Competition are under the responsibility of MEF and shall be published with their authorisation.

### **A.2.2 Regulatory ambiguities**

Possible ambiguities or questions as regards the meaning or intention of the regulations will be solved exclusively by the MotoStudent Organisation.

### **A.2.3 Validity of the Regulations**

The Regulations of the MotoStudent Competition published on the website [www.motostudent.com](http://www.motostudent.com), are the only Regulations valid for the V International Competition MotoStudent 2017/2018.

- A.2.3.1 The Regulations from past editions (I, II, III o IV Edition) of the MotoStudent Competition will not be valid for the V International Competition MotoStudent 2017/2018.

#### **A.2.4 Compliance of the Regulations**

By taking part in the MotoStudent Competition, the team, the team members as individuals, the faculty advisors (tutors), riders and any other university staff member accept and submit themselves to the observance of the Organization's Rules, both in the Regulations of the Competition and in subsequent official documents, as well as the rules of the sports complex where the Final Event will be held.

#### **A.2.5 Right to compensation and complain**

Any team has the right to protest and suggest. The Organization Committee will review any doubt, breach or penalty presented by the official method in a fast and fair way.

A.2.5.1 A team may protest any disagreement with any action by the Organization, either in the scoring of the Competition or other official action that can be considered as causing damage to its team or its score.

A.2.5.2 Any team may lodge a protest against another participating team if they observe any breach of the Competition Regulations or improper conduct.

A.2.5.3 Protest format: All protests and complains must be submitted to the Organization following the presentation format reflected in Article H.1.2 of these Regulations, stating the article of the Regulations which is considered to have been breached, with enough proof to be verified. The protests and complains prior to the Final Event may be sent scanned or digitally signed by email to [faq@motostudent.com](mailto:faq@motostudent.com), while protests and complains during the Event must be submitted in writing to the Organization.

A.2.5.4 For "non-sporting" protests and complains, exclusively concerning the MotoStudent specific Regulations, regardless of the sporting area, the applicant team shall put 50 points at stake on the score of the Phase or test to protest. If the Organization approves the resolution in favor of them, the 50 points shall be given back to the protesting team, if not, and the protest is refused, the team shall lose the 50 points. A "non-sporting" protest or complain is understood as any that does not concern sports aspects under the responsibility of the Race Direction or Motorcycling Federation.

- A.2.5.5 For "sporting" protests and complains, the applicant team will have to put 50 points at stake on the score of the Phase or test to protest and also €300, as a deposit. If the Organization approves the resolution in favor of them, the 50 points and €300 shall be given back to the protesting team, if not, and the protest is refused, the team shall lose the 50 points and €300. A "sporting" protest or complain is understood as any that concern sports aspects under the responsibility of the Race Direction or Motorcycling Federation.
- A.2.5.6 Time to lodge a protest: Protests related to any aspect of the tests developed during the Final Event, must be lodged not later than 30 minutes after the publication of the results of the respective test. Protest related to deliveries of milestones prior to the Final Event during the development of the Competition must be submitted within a period of 7 calendar days from the communication or publication that reflects the incidence to be protested.
- A.2.5.7 The Organisation will be responsible for the final decision on the protest. This decision will be final and cannot be appealed.
- A.2.5.8 Only in the purely sporting field will it be possible to request an appeal procedure: As it is stated in Article 119 of the R.F.M.E Sporting Regulations, any participant may appeal to penalties imposed or decisions taken by the Organizing Committee and the Race Management to the Disciplinary Court of the RFME. Any appeal may be presented in writing and signed by the interested with a caution of 800€. The right for appeal expires after fifteen days from the communication of the sanction.
- A.2.5.9 Sport appeal to FIM: As it is stated in the R.F.M.E Sporting Regulations, in its article 119, at the request of a team it is possible to lodge appeals to the F.I.M., through the R.F.M.E., being the only one to judge the opportunity of the formulated appeal, being able to refuse the process without being obliged to explain the causes and reasons that induce it. The right of appeal does not imply the suspension of the penalty or sanction; however, when R.F.M.E. accedes to raise an appeal to the F.I.M., the appellant may obtain, prior to the appropriate request, that the appeal may lead to the temporary suspension of the decision, but in this case, it must submit, together with the appeal, the guarantee deposit stipulated by the F.I.M.

## **A.2.6 Penalties for non-compliance with Regulations**

The Organization has the right to penalise all those teams breaching aspects of the Competition Regulations and established schedules, as well as all those teams that show a non-sportsmanlike behaviour or that may put people and facilities at risk.

A.2.6.1 The Organization shall establish sanctions according to the following criteria:

- Minor infraction: penalty of 10 points at the test stage to evaluate.
- Serious infraction: Exclusion of the phase to evaluate. Depending on the seriousness of the fault, the Organization may even exclude the team from the Competition.
- Sports penalties in the MS2 Phase: to be determined by the Race Direction

A.2.6.2 It is considered as minor infraction timely breach of the defined schedule, delivery of documentation (with the exception of deliverable milestones involving specific penalties), specific non-compliance of paddock and pit lane rules, or similar acts.

A.2.6.3 It is considered as serious infraction repetitive breach of the cases set out in the Article A.2.6.2, disobedience to orders given by the Organization or Race Direction, unsportsmanlike or aggressive behavior, acts prejudicial to the people attending, etc...

A.2.6.4 During dynamic tests of the MS2 Phase on the race track, the Race Direction may apply the relevant penalties for noncompliance with sports regulations. These penalties may be accompanied by penalties in the punctuation.

## **A.2.7 Right of confiscation**

The Organization reserves the right to confiscate or hold during the Final Event any motorbike that considers non-complying with the Competition Regulations.

A.2.7.1 If a motorcycle is confiscated during the Final Event, the Organization agrees to return it to its owner team at the end of the Event.

## **A.2.8 Changes to the Regulations**

The MotoStudent Organization has the right to change the Competition Regulations, as well as the calendar of the Competition, if it considers it necessary. Any change to the regulations, will be added in Section I: Modifications glossary, and will be published on the website.

- A.2.8.1 The Organization Committee will announce the changes to the Regulations through the means considered as most suitable to make the changes known. Regardless of the means used, the changes will always be published on the website of the Competition..

## **ARTICLE 3: PARTICIPATION REQUIREMENTS**

### **A.3.1 Eligibility**

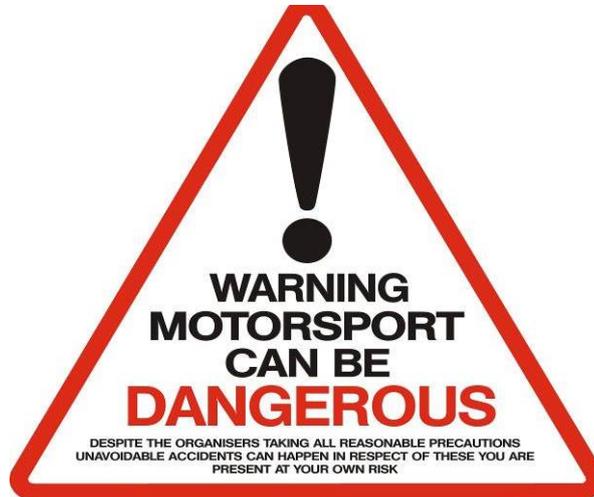
The Competition has a purely academic objective, being a multidisciplinary project with a great importance in the areas of engineering, economics and project management. Although the project is based on the development and manufacture of a racing motorcycle prototype, it is not a conventional speed race. Therefore the only participants eligible for the competition are university graduate or post-graduate students, or students from vocational technology institutes (included in a university team), whose main activity is not training in the field of motor racing in any of its forms.

- A.3.1.1 There is no limit in the number of teams set for each University. Each University may submit as many teams as they like for any category of the Competition

- A.3.1.2 Each registered team may only submit one project and one prototype.

### A.3.2 Liability Waiver

All participants, including students and tutors, must sign a liability waiver when entering the Competition. The rest of the people attending the Final Event with the teams will be considered as general public.



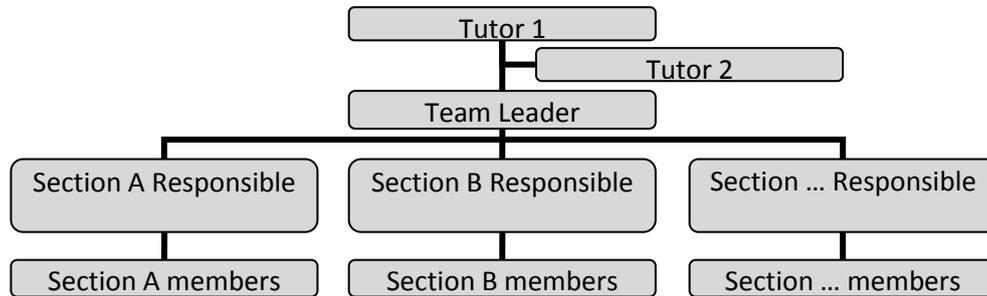
**Motorsport can be dangerous**

### A.3.3 Heads of the team: Faculty Advisor and Team Leader

Each team must appoint one or two faculty advisors, as well as a student delegate enrolled in the team, who will be recognized as "Team Leader"

- A.3.3.1 The Faculty Advisor should accompany the team during the Final Event and will be considered as the highest responsible person for the team. Should the Faculty Advisor not be able to attend the Final Event, the responsibility will be delegated to the Team Leader as the maximum responsible of the team.
- A.3.3.2 Faculty Advisors may advise their teams on general engineering and theoretical aspects of their projects.
- A.3.3.3 In no case may the Faculty Advisors design any part of the motorcycle, or take part in the development of any document or presentation.
- A.3.3.4 Faculty Advisors are not allowed to assemble or manufacture any component of the motorcycle, and they shall not even repair or help during repairs at the Final Event. For the avoidance of doubt, Faculty Advisors are not allowed to handle the motorcycle.

A.3.3.5 The internal hierarchy of the teams is the responsibility of the internal organization of each team, but it is advisable to establish the following hierarchical order in the taking of decisions or actions:



**Recommended team structure**

A.3.3.6 At least one of the Faculty Advisors must be able to represent the University in administrative terms over the three semesters of the Competition.

A.3.3.7 The Team Leader will have the same rights and obligations as the rest of enrolled students, but he/she will act as a communication link with the Organization and representation of the team in the absence of the Faculty Advisors.

A.3.3.8 If there are any changes in the figure of the Faculty Advisors or Team Leader, for justified reasons, it should be communicated as soon as possible to the Organization to take into account the new positions.

### **A.3.4 Participants**

Entered teams and team members registered in the Competition will be considered as "participants of the event" from the moment they enter until the end of the Final Event.

A.3.4.1 Each team will have at least 7 participants.

A.3.4.2 Every university team participating in MotoStudent must include in their team name the name of the University or College they belong to.

A.3.4.3 Other technical colleges, such as vocational training centres can also collaborate with the team, as they could complement the participating university due to their special facilities and equipment.

A.3.4.4 During the Final Event, only the officially entered students will be allowed to access the different working and activity areas.

A.3.4.5 The consideration of the Competition and its compatibility with the curriculum will be decision of each university. The represented University has no obligation of including MotoStudent Competition in its curriculum, not even as free-elective formation.

A.3.4.6 To participate at the Competition, in the academic aspect is required only for students to be enrolled in 2016/2017 and/or 2017/2018 courses, regardless of the percentage of subjects or credits passed.

### **A.3.5 Cancellations and replacements**

The deadline to change the composition of the teams is 31 December 2017. Until that date, teams may add more members, replace students with other students or remove members, always bearing in mind that the minimum number of team members must be 7. From that date only modifications of members will be accepted under justified causes.

A.3.5.1 The substitution of team members (until 31<sup>st</sup> of December, 2017), does not entail any additional cost. From 1<sup>st</sup> of January, 2018, each modification of members will entail the payment of an administrative fee for management expenses, according to Art.A.3.8.

A.3.5.2 The entry fees for the removal of team members will not be refunded.

A.3.5.3 The Faculty Advisor and/or the Team Leader must notify the Organization about any change regarding the participating students from time to time.

A.3.5.4 Modifications on the participating students must apply or communicate via email through the registry email direction: [registry@motostudent.com](mailto:registry@motostudent.com)

### **A.3.6 Rider**

Each team must nominate a rider who will be in charge of riding the motorcycle during the MS2 tests on the race track. In order to equalize advantages between teams, and since the goal of the competition is to evaluate the bike and the work done by the teams from the engineering side, the Organization has taken the following considerations about the chosen rider.

A.3.6.1 The rider is considered as a team member from the moment he/she is approved by the Organisation, and he/she shall have the same rights and obligations as any other team member, except for the academic requirements, which are not applicable to him/her.

A.3.6.2 The rider does not need to pay any entry fee for the competition.

A.3.6.3 The rider must be of age (18 years or older) at the day of start of the 2018 Final Event.

A.3.6.4 The participation of riders who have raced since 2008 (included) in international competitions recognized by the FIM of the following disciplines will not be allowed:

- Circuit Racing
- Motocross
- Enduro
- Rallies
- Track Racing

In this exception is included any rider who has participated as a Wild Card in any of these disciplines.

Is not considered in this exception rider that have participate in previous editions of MotoStudent.

A.3.6.5 A student can federate or be federated, and participate as a rider. However, if it is not registered as a team member he/she will be able to ride the bike, but not to manipulate it as mechanic or team member. If such student wants to become a rider and also to manipulate the bike as a team member, the he must be registered and pay the required fees to do so.

A.3.6.6 The rider must be able to prove that he/she is affiliated to a motorcycle federation for its participation at the Final Event.

A.3.6.7 Federative requirements for riders: the participating riders in MotoStudent must comply the following documentation:

Spanish riders:

Rider CE License (can be temporary for the Final Event)

Or

FIM International License

Or

Territorial License of the Aragonese Motorcycling Federation (FARAM)

Non-Spanish riders

Rider CE License (can be temporary for the Final Event) + Rider Release Permission of their country Federation (Start Permission)

Or

FIM International License + Rider Release Permission of their country Federation (Start Permission)

\* These federative requirements may vary according to the conditions imposed by the motorcycle federations involved (FIM, RFME y FARAM) for the 2018 season.

### **A.3.7 Insurances**

The entered universities must include the work carried out in the teaching plan, so that this competition is included within the activities covered by the education insurance.

A.3.7.1 However, the Organization will have a private liability insurance covering all of the team members in case of an accident during the Event at the facilities of Speed Circuit of MotorLand Aragón. Physical damage to team members, if it derives from their work in the box, will not be covered by this insurance. To do, teams must check the scope of their student insurance coverage and, if not cover, hire one.

A.3.7.2 The Event will have the medical resources and the required security in terms of the sportive requirements.

A.3.7.3 The Organization is not liable for material or physical damage that may be caused during the development or handling of the prototype by each team.

### **A.3.8 Administrative procedures and fees**

The administrative procedures requested by the teams to the Organization of the Competition, which are not part of the development of the milestones and activities, will incur in a standard administrative fee for management costs of € 10.47 (VAT included). Some examples of administrative procedures are:

- Issuance of certificates and other justification documents. The final Diploma for students and Faculty advisors that will be submitted during the Final Event is not included here.
- Issuance of a duplicate of the participation diploma.
- Modification, incorporation or elimination of the documentation presented in the administrative milestones reflected in the Calendar of Article 6 of Section A of these Regulations.
- Modification of team data: figures of faculty advisors and team leaders, team or university name, etc.
- Substitution, incorporation and cancellation of team members (from January 1, 2018).
- Management of parcels, shipments, and storage of prototypes and other teams elements for the MotoStudent Final Event.

## **ARTICLE 4: MANUFACTURING THE MOTORBIKE**

### **A.4.1 Manufacturing**

The motorbikes taking part in MotoStudent must be created, designed and manufactured by the students registered in the team without the direct involvement of professional engineers, race engineers, professional mechanics, etc. The team must submit a certificate of manufacture, certifying this aspect. The Organization will provide for a respective certificate form.

#### **A.4.2 Sources of information**

Teams may use all kinds of literature, knowledge related to the design of motorcycles and information from professionals.

#### **A.4.3 Professional help**

Professionals are not allowed to make decisions about the design. The tutor shall also sign the declaration of compliance.

#### **A.4.4 MotoStudent Kit**

The Organization will provide all teams with a kit including all parts that are compulsory to be installed in the prototypes. The Technical Regulations relating to this Kit is defined in Sections B, C and D hereto.

A.4.4.1 The MotoStudent Kit for the teams registered in the Category "MotoStudent Petrol" consist of the following components:

- Internal combustion engine.
- 1 set of front and rear slick tires.
- 1 set of front and rear rims.
- Brake calipers and pumps (Front and rear).

A.4.4.2 The MotoStudent Kit for the teams registered in the Category "MotoStudent Electric" consist of the following components:

- Electric Motor.
- Isometer Insulation Monitoring Device (IMD).
- 1 set of front and rear slick tires.
- 1 set of front and rear rims.
- Brake calipers and pumps (Front and rear).

- A.4.4.3 The supply of the MotoStudent Kit is included in the registration fees of the team.
- A.4.4.4 The shipping cost of the MotoStudent Kit to the facilities indicated by the teams is also included. There are not included the duties or special taxes of the destination countries, states or other zones, that shall be borne by the transport receiving team.
- A.4.4.5 The teams must be informed previously to the sending of the kits about tariff policies and logistical limits derived of the shipping destination to avoid retentions of the material.
- A.4.4.6 It is possible that depending on the country where the team is located, will not allowed the sending of any of the components included in the MotoStudent Kit. In that case, the Organization will contact the team to find alternative solutions to the management of these components.
- A.4.4.7 The parts included in the MotoStudent Kit for both categories should be used for the sole purpose of the develop of the prototypes for the V Edition of MotoStudent and their participation in it. Is strictly forbidden use these parts for other applications out of MotoStudent.
- A.4.4.8 The Organization will deliver with the MotoStudent Kit the corresponding Technical Passport, which shall contain the information and references of the parts included. This Technical Passport must be shown to the Technical Corps of the Organization at the static safety check at the Final Event.
- A.4.4.9 The parts included in the MotoStudent Kit will incorporate an identifying mark. This marking must remain intact, as it will be checked by the Technical Staff of the Organization at the Final Event. In case of breaking or damage of these markings, teams should contact the Organization to determine a solution.
- A.4.4.10 Any technical question relating the parts included in the MotoStudent Kit should be channeled through the Technical Staff of the Organization through email to [faq@motostudent.com](mailto:faq@motostudent.com). It is forbidden direct contact between the participating teams and the supply companies for technical issues regarding the MotoStudent Kit.

## ARTICLE 5: NON-EUROPEAN TEAMS

### A.5.1 Transport of the bike and material

The shipment of vehicles in commercial transport must comply with the laws and regulations of the countries to which the motorcycle is being sent. We recommend the teams to ask a shipping company in order to make sure that the shipment complies with all of the requirements regarding shipment, customs, import/export and aviation.

It is recommended to manage the delivery of the bike well in advance to avoid delays that prevent the prototype be in time to compete in the Final Event.

### A.5.2 Reception of the bike and material

The vehicles and materials must be sent, for their participation in the Event, to the team or the university they belong to. In no case may the Organisation or the venue of the event be the recipient of the shipment.

### A.5.3 Reception direction

We recommend shipping the bike, materials, tools, etc. to a university or a partner Company with physical facilities in Spain. However, if you want to send directly to the place of the event, the shipment should be performed with the following guidelines:

- Addressee: Team or University name.
- Adress: Motorland Aragón - Circuito de Velocidad, Ctra. TE-V-7033 km.1, 44600 Alcañiz – Teruel (España)
- Contact phone: Team contact phone

#### A.5.4 Visa

Organization cannot grant any type of visa or invitation letter to participants from outside the EU. The teams themselves must get their own visas. The Organization may not intervene or contact any agency, Embassy or Consulate to resolve any issue concerning the visa of the members of each team.

However, in the MotoStudent Competition registration documents and other proof of participation in the competition, can be used as justification or demonstration for issuing visas, if the relevant agency may require it.

The organization recommended to the teams not belonging to the EU that ensure all aspects on the visa and the trip in general as soon as possible, to avoid last-minute unforeseen.

Information and questions about the requirements for travel to Spain are collected on the website of the Ministry of Foreign Affairs and cooperation of the Government of Spain: [www.exteriores.gob.es](http://www.exteriores.gob.es)



A.6.2.1 Milestones of an administrative nature:

- Team Registration (From 28/12/2016 to 30/04/2017): Stage enabled for the team registration through the official website: [www.motostudent.com](http://www.motostudent.com).

- Administrative Milestone 1: Team data and structure (From 01/07/2017 to 31/07/2017): The Organization will send a form that the teams must provide with general data of the team, departments and functions in which the team, agents and external collaborators are structured.

- Administrative Milestone 2: Team members presentation (From 01/12/2017 to 31/12/2017): The Organization will publish a form to fill in the final data of the registered students. It should also be accompanied by the Student enrollment justification and a declaration of conformity with the Regulations.

- Administrative Milestone 3: Rider presentation (From 01/06/2018 to 30/06/2018): The Organization will publish a form to fill in the rider data to present: name, ID, racing career, type of license to present, etc.

- Administrative Milestone 4: Data for accreditations (From 01/08/2018 to 31/08/2018): Documentation and pictures for access passes during the Final Event.

- Administrative Milestone 5: Rider Licenses submission (From 01/09/2018 to 15/09/2018): Presentation of the appropriate Federative License to take part in the MS2 tests. See Art. A.3.6.7

- Administrative Milestone 6: Data for the Event (From 15/09/2018 to 30/09/2018): The Organization will publish a form about the details to specify for the logistic and administrative organization of the Event.

A.6.2.2 Milestones of the MS1 Phase:

- MS1 Delivery 1: Part A - Conceptual Design and Targets (From 01/10/2017 to 31/10/2017): See<sup>o</sup> Art. F.2.2.

- MS1 Delivery 2: Part B - Detailed Design (From 01/03/2018 to 31/03/2018): See Art. F.2.3.

- MS1 Delivery 3: Part D - Industrial Production (From 01/04/2018 to 30/04/2018): See Art. F.2.5.

- MS1 Delivery 4: Part E - Business Plan (From 01/04/2018 to 30/04/2018): See Art. F.2.6.

- MS1 Delivery 5: Part F - Technological Innovation project (From 01/05/2018 to 31/05/2018): See Art. F.2.7.

- MS1 Delivery 6: Part C - Prototyping and Validation (From 01/07/2018 to 31/07/2018): See Art. F.2.4

- MS1 Delivery 7: MS1 Project addendums (From 01/08/2018 to 31/08/2018): Optional, See Art.F.3.3

- MS1 Delivery 8: MS1 presentation (ppt) (From 01/09/2018 to 30/09/2018): See Article 4, Section F of this Regulation.

A.6.2.3 Specific milestones for teams of MotoStudent Electric Category: See descriptions in Art.D.13.1.1

- MSE Special Milestone 1: Complete electric scheme (From 01/11/2017 to 30/10/2017)

- MSE Special Milestone 2: Battery accumulator features (From 01/02/2018 to 28/02/2018)

- MSE Special Milestone 3: Description of the accumulator assembly (From 01/05/2018 to 31/05/2018)

- MSE Special Milestone 4: Description of track tests (From 01/07/2018 to 31/07/2018)

A.6.2.4 Final Event: The specific date and time of tests and activities shall be published by the Organization

### **A.6.3 Penalties for delays in milestones**

The deadlines stipulated in the Competition Schedule (see Art. A.6.1.) must be met. In case of delayed delivery of the stipulated milestones the following penalties will be applied:

A.6.3.1 The delay in compliance with each administrative milestone will entail the following penalty:

[2 MS1 points + 2 MS2 points] per day of delay (Max. 20 points → 10 + 10).

A.6.3.2 The delay in compliance with the specific milestones of the MotoStudent Electric Category will entail the following penalty:

[2 MS1 points + 2 MS2 points] per day of delay (Max. 20 points → 10 + 10).

A.6.3.3 The delay in compliance with specific Milestones of MS1 Phase will entail 2 points of penalty in the corresponding part of the MS1 project (A, B, C, D, E or F) per day of delay (Max 20 points).

- A.6.3.4 The accumulated penalties on the MS1 Phase in the delay of the administrative and / or specific milestones of the MotoStudent Electric Category will be distributed at the end of the Competition in the proportion in which the Project is divided according to the distribution of scores reflected in Art. F.5.1.
- A.6.3.5 The accumulated penalties on the MS2 Phase in the delay of the milestones will be applied to the final score of MS2 Phase.

## **ARTICLE 7: COMMUNICATION BETWEEN TEAMS AND ORGANIZATION**

### **A.7.1 Publication of questions: Frequently Asked Questions (FAQ)**

By sending a question to the Organisation, the teams acknowledge that the Organisation has the right to publish the question in part or as a whole, as well as the official answer, on the FAQ file, as well as in other official publications.

- A.7.1.1 The FAQ file will collect the common doubts related to the MotoStudent Competition submitted by the teams, and will be published and distributed regularly by the Organization.
- A.7.1.2 Registered teams shall read the updates of the FAQ file.

### **A.7.2 Types of questions**

The Organization will answer all the questions not answered in the Competition Regulations or the FAQ file.

The Organization reserves the right to answer a question that is clearly explained by means of the Competition Regulations, FAQ file or other official document

### **A.7.3 Consultation procedure**

All questions addressed to the Organization must comply with the following format:

- Full name of the person asking the question.
- Category (MotoStudent Electric / MotoStudent Petrol).
- Bike number
- Name of the team
- Affected article/s of the Regulation
- Question

A.7.3.1 In the question should be indicated the Article of the Regulation to which the consultation refers, or if applicable the reference FAQ number or official document on which it arises.

A.7.3.2 It is recommended to not attach any picture, drawing or file which exceeds 500KB in size. The Organization does not guarantee the correct reception of emails with a size bigger than 2Mb.

### **A.7.4 Response time**

The Organisation undertakes to answer all questions as soon as possible. Considering the fact that some questions may need more time to be answered, due to the complexity or need for outpatient, the estimated maximum response time will be 15 natural days.

### **A.7.5 Destination address**

Depending on the content of the questions must be sent to the appropriate Department:

Questions of technical content, about MS1 Phase or MS2 Phase: [faq@motostudent.com](mailto:faq@motostudent.com)

Administrative questions and general info: [info@motostudent.com](mailto:info@motostudent.com)

A.7.5.1 The Organization will not solve any doubts by telephone. All questions must be submitted and solved by email or other electronic system determined by the Organization.

## **ARTICLE 8: CATEGORIES**

The MotoStudent Competition has two different categories:

- MotoStudent Petrol
- MotoStudent Electric

### **A.8.1 Category MotoStudent Petrol**

This category is characterized by using as method of propulsion a 4 stroke internal combustion engine provided by the Organization.

The Rules relating to the Category "MotoStudent Petrol" are defined over these Regulations in their respective sections.

### **A.8.2 Category MotoStudent Electric**

This category is characterized by using as method of propulsion a 100% electric system provided by the Organization.

The Rules relating to the Category "MotoStudent Electric" are defined over these Regulations in their respective sections.

### **A.8.3 Scoring of each Category**

Each Category will be developed in parallel and independently throughout the entire Competition and during the Final Event.

A.8.3.1 Each category will have its corresponding evaluation and rating, as well as testing and milestones to be met.

A.8.3.2 Due to safety issues during the Final Event, may not coincide both categories simultaneously on the track or boxes.

## ARTICLE 9: PHASES OF THE COMPETITION

The projects and prototypes presented will be judged and assessed in a series of different tests, divided into different phases, called MS1 and MS2.

### A.9.1 Levels to be passed

The different levels that the projects will have to pass are shown in the following table

PHASE	EXCLUSIVE	SCORING
Administrative Milestones	Yes	* Can penalize
Scrutineering	Yes	No
MS1: Project Deliveries	Yes	Yes
MS2: Dynamic tests	Yes	Yes

A.9.1.1 In order to be assessed in each of phases, all participating teams shall have successfully completed the minimum level required in each of the previous phases to which it is judging at the moment (e.g., to score in the MS2 Phase is essential to have exceeded the minimum of 40% in the previous MS1 phase, As indicated in Art.G.1.1.1)

### A.9.2 Scrutineering

Para que las motos y proyectos puedan participar en la Competición deberán cumplir los requisitos mínimos de resistencia, seguridad y funcionamiento indicados en la Secciones B, C y D (Reglamentos Técnicos) del presente Reglamento.

A.9.2.1 The methodology and process of making the scrutineering are defined in Section E of these Regulations

A.9.2.2 The teams that passed scrutineering at the Event will be able to compete in the following phases.

### **A.9.3 MS1 Phase: Industrial Project**

The MS1 Phase is a demonstrative phase during which the participating teams must show and explain the design of the prototype and the industrialisation projects for mass production.

A.9.3.1 The Rules and information regarding the MS1 Phase, for both categories of the Competition are described in section F of this Regulations.

### **A.9.4 MS2 Phase: Dynamic tests**

To Score in demonstrative MS2 Phase is necessary to have passed with at least 40% over the total MS1 Phase score.

A.9.4.1 The Rules and information regarding the MS2 Phase, for both categories of the Competition are described in section G of this Regulation..

### **A.9.5 Awards**

Based on the results of the different phases and tests, the Organization will give a series of awards.

A.9.5.1 The specific awards of the MS1 Phase are detailed in Article 5 of Section F of these Regulations.

A.9.5.2 The specific awards of the MS2 Phase are detailed in Article 8 of Section G of these Regulations.

A.9.5.3 In addition to the specific awards of each Phase, the following general prizes will be awarded:

- Best MotoStudent: Awarded to the team that obtains the maximum score in the sum of the results of the MS1 + MS2 Phases
- Best Rookie team: Awarded to the newly incorporated team (representing a university not registered in any of the previous editions of MotoStudent) that obtains the maximum score in the sum of the results of the Phases MS1 + MS2

A.9.5.4 Total summary of the prizes of the Competition:

<b>MotoStudent Petrol</b>	<b>MotoStudent Electric</b>
MS1 Phase	
Best MS1 Industrial Project	Best MS1 Industrial Project
Best Design Project	Best Design Project
Best Technological Innovation	Best Technological Innovation
MS2 Phase	
1st Classified	1st Classified
2nd Classified	2nd Classified
3th Classified	3th Classified
General Awards	
Best MotoStudent	Best MotoStudent
Best Rookie Team	Best Rookie Team

A.9.5.5 The economic and material value of each prize will be published by the Organization to all registered teams.

## **V International Competition MotoStudent**

### **SECTION B: GENERAL TECHNICAL REGULATIONS**

## **ARTICLE 1: TECHNICAL REQUIREMENTS OF THE MOTORCYCLE AND RESTRICTIONS**

### **B.1.1 Introduction**

The bikes presented to compete in MotoStudent must be self-made prototypes.

B.1.1.1 The design and manufacture of the presented prototypes must comply with the Rules imposed by these Regulations, to participate in the scoring Phases of Competition.

B.1.1.2 The prototypes must maintain all the specifications required in the Technical Regulations for all tests of the Final Event.

B.1.1.3 Any failure to comply with the technical requirements and restrictions should be corrected and re-inspected before the bike can participate in any test during the Final Event.

B.1.1.4 The rules reflected in this Section B of the Regulations equally affects both the Category "MotoStudent Petrol" and the Category "MotoStudent Electric" of the Competition, except for the articles where are indicated special requirements for a specific Category.

### **B.1.2 Changes and repairs**

Once the static and dynamic scrutineering of the Event (See Section E) have been passed and the motorcycle has been validated for the MotoStudent Competition, any structural change without the supervision of the Technical Staff of the Organization will be strictly forbidden. Before making any structural modification shall make known to the Organization, which must give approval and recheck the prototype after the modification.

The changes allowed after the technical verifications that does not involve supervision by the Organization are:

- a) Chain adjustment
- b) Brake adjustment
- c) Changes in the data recording
- d) Tyre pressure adjustment
- e) Refilling fluids
- f) Set-up adjustments
- g) Engine set-up adjustments.

Should a motorcycle need to be repaired after an accident, collision or breakdown, the repair must be approved by a technical official. Once the motorcycle has been repaired, the supervising technical official must have to give his approval to let the motorcycle return to the competition.

### **B.1.3 Other Competitions**

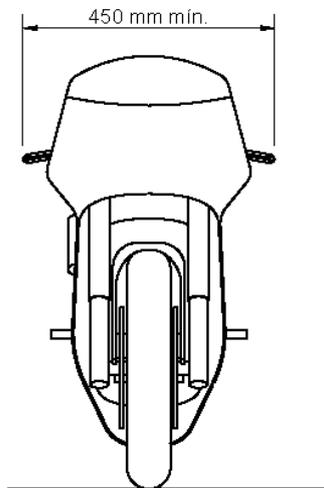
The present General Technical Regulations has been created exclusively for the MotoStudent Competition, so motorbikes manufactured according to the specifications reflected on these Regulations do not have to adhere to the requirements of other speed competitions outside MotoStudent. The Organization is not responsible for the use that the different teams can make with the prototypes presented at MotoStudent in other competitions.

## ARTICLE 2: GENERAL DESIGN REQUIREMENTS

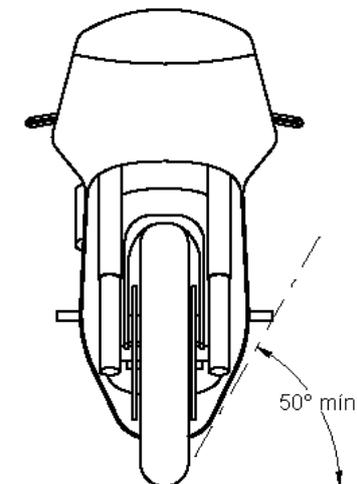
### B.2.1 Dimensions

The dimensions of the motorcycle are free, except for the following basic requirements.

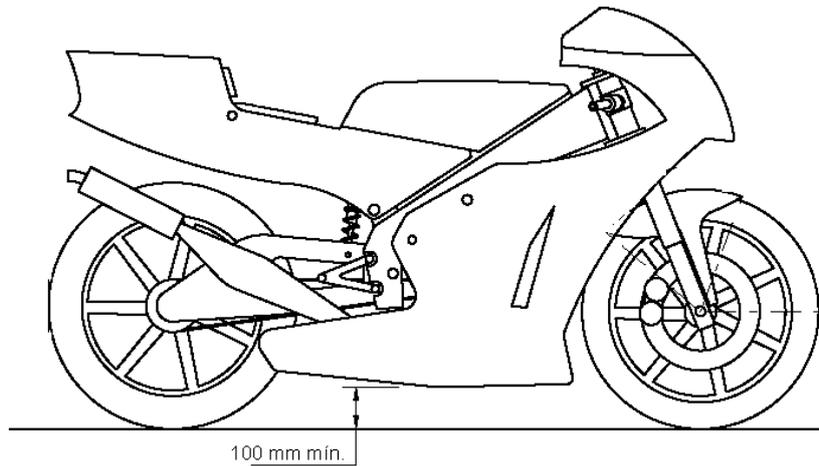
- B.2.1.1 The minimum width between the ends of the semi-handlebars must be 450mm.



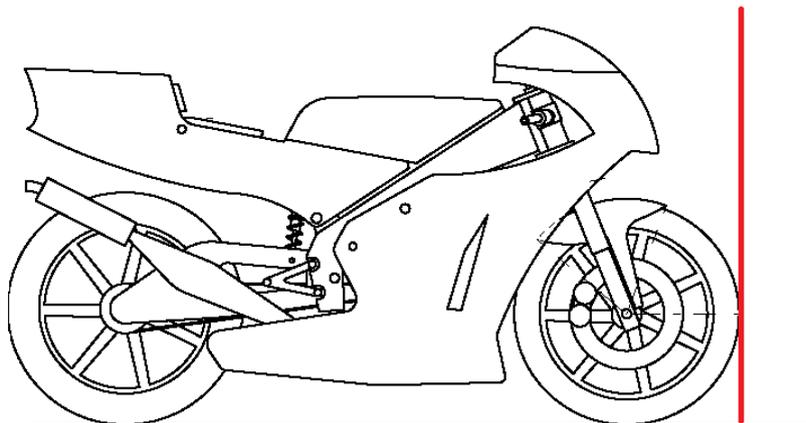
- B.2.1.2 The minimum tilt angle of the motorcycle without any of its elements (except the tyres) touching the road surface must be  $50^{\circ}$ . This measurement will be made with an unloaded motorcycle (i.e. without the rider) but fully equipped, fluids included, and in working condition.



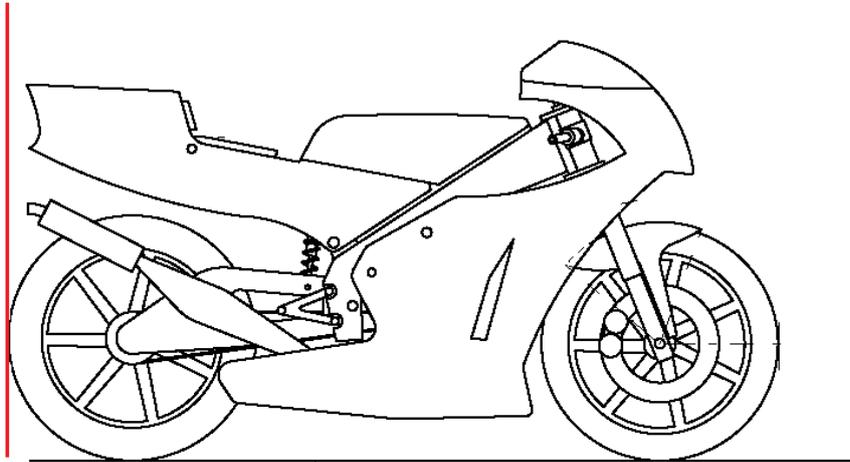
B.2.1.3 The minimum distance between the motorcycle in upright position and the road surface must be of at least 100mm in rest situation. This measurement will be done with the motorcycle unloaded (ie without the rider), but with all the equipment and liquids for its operation (including 1 liter of gasoline for motorcycles of the Category MotoStudent Petrol).



B.2.1.4 Front limit: No element of the motorcycle shall protrude from the front vertical line drawn tangentially with respect to the external circumference of the front tyre.

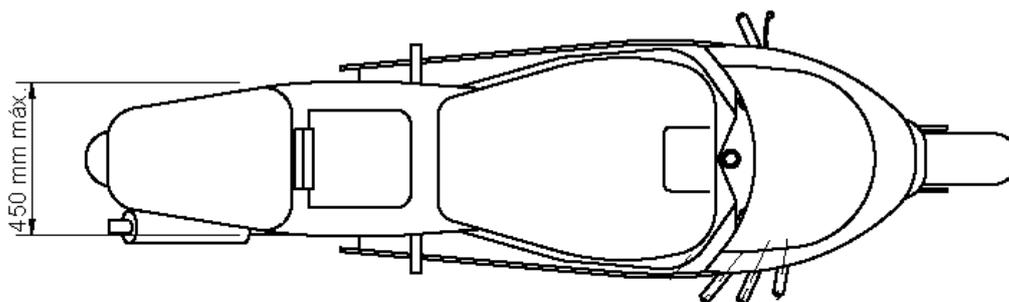


B.2.1.5 Rear limit: No element of the motorcycle shall protrude from the vertical line drawn tangentially with respect to the external circumference of the rear tyre.

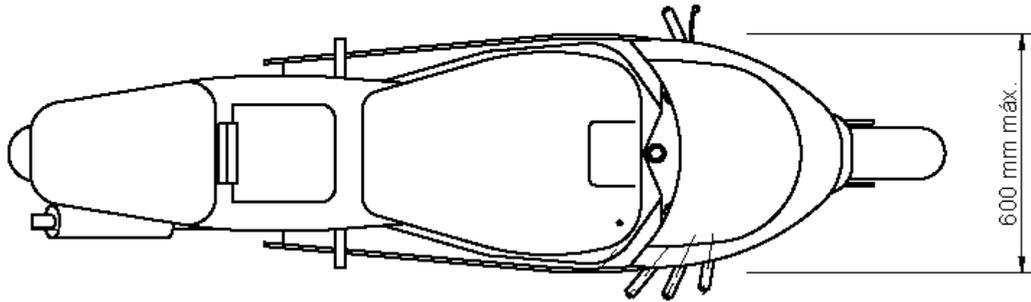


B.2.1.6 The tire tread shall have a minimum clearance of 15mm along its outer circumference to any part of the motorcycle, with the motorcycle in any position and with any geometry set-up.

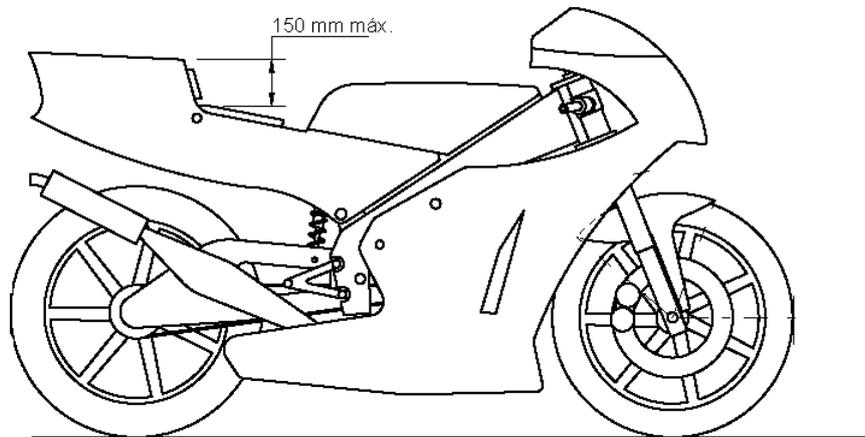
B.2.1.7 The minimum width of the saddle must not exceed 450mm. No other element of the motorcycle shall protrude from this width from the saddle to the rear except for the exhaust system for bikes of the Category "MotoStudent Petrol".



B.2.1.8 The maximum width of the fairing shall be 600mm.



B.2.1.9 The maximum height difference between the height of the saddle and the highest part of the tail shall be 150mm.



## B.2.2 Weight

B.2.2.1 The total minimum weight of the motorcycle without the rider shall be 95kg for both categories, including all fluids that may be necessary for the correct operation of the bike. For bikes of the Category "MotoStudent Petrol" at least one liter of fuel must be included within this weight.

B.2.2.2 The weight of the complete motorcycle shall not be below the minimum weight indicated in Art. B.2.2.1. at any time during the Final Event.

B.2.2.3 During the final scrutineering, at the end of the MS2 Phase, the chosen motorcycles will be weighed in the same conditions as they finished the race, and the weight limit shall be measured in this condition. Nothing can be added to the motorcycle. This includes all fluids.

B.2.2.4 The riders might be called-in to weigh their motorcycles during the MS2 dynamic tests. The riders must attend to this call in any case.

B.2.2.5 The use of ballast to reach the minimum weight is allowed. The ballast must be declared to the technical officials during the scrutineering.

B.2.2.6 Mobile ballast must be properly fixed to the chassis, so it cannot become detached from the bike in case of shock or fall. It can be installed by zipties or screwed

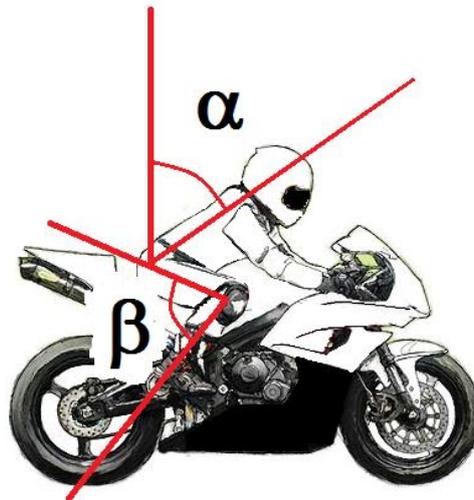
### B.2.3 Ergonomics

The design of the motorcycle must be within the ergonomic limits for a rider of an average size and weight.

B.2.3.1 It is allowed to install adjustable steering elements to improve ergonomics and comfort for the rider.

B.2.3.2 The elements and symbols reflected in the instrument panel and controls, as well as indicators in the display must be perfectly legible in the normal riding position.

B.2.3.3 Taking the percentile of sizes P95 (comprising 95% of the population), the position of riding of a standard sports motorcycle, in normal driving (not in a position of maximum speed) position, is comprised by the following angles:



Ergonomics position angles

Where:

- $\alpha$ : Angle between the Vertical and the rider's back. Angles between 19 and 40 degrees are recommended for a sports motorcycle.
- $\beta$ : Knee flexion angle. Angles between 65 and 77 degrees are recommended for a sports motorcycle.

## **ARTICLE 3: FRAME**

### **B.3.1 Design**

The use of a commercial frame is not allowed, not even a modified unit. It must be a new, self-manufactured and self-designed frame prototype.

The main frame, the subframe and the swingarm is included in this article.

B.3.1.1 There are no restrictions in the type of design of the frame, swingarm or subframe, provided that the result complies with the rules imposed by these Regulations

B.3.1.2 In case of doubt about the safety of the frame design submitted, the Organization may request a safety justification report that includes analysis using the finite element method, simulations or other demonstration tests.

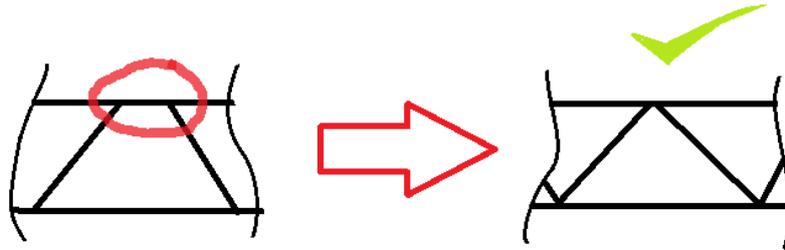
### **B.3.2 Materiales**

It is not allowed to manufacture the frame with titanium or titanium alloys. Regarding the rest of materials there are no restrictions.

### B.3.3 Welding and unions

Welding of structural elements by any means is permitted, but must be a consistent structure

B.3.3.1 Structures of jalousie type must search the correct triangulation in the nodes of the structure.



Example of correct triangulation

### B.3.4 Crash protectors

B.3.4.1 It is mandatory to use protection caps made of Nylon, fiber or materials of similar hardness, to protect the chassis and propulsion system laterally in case of fall

B.3.4.2 The crash protectors may be installed both inside and outside the fairing, wheel axles, handlebars ends or other locations provided that they protect laterally the entire frame and propulsion system.



Example of crash protector

## **ARTICLE 4: FAIRING**

### **B.4.1 General requirements**

- B.4.1.1 All edges and finishes of the fairing must be rounded. Minimum radius 1mm.
- B.4.1.2 The fairing cannot cover the rider sideways, except for the forearms (this exception only applicable in minimum aerodynamic resistance position of the rider).
- B.4.1.3 There are no restrictions regarding the manufacturing material of the fairing.

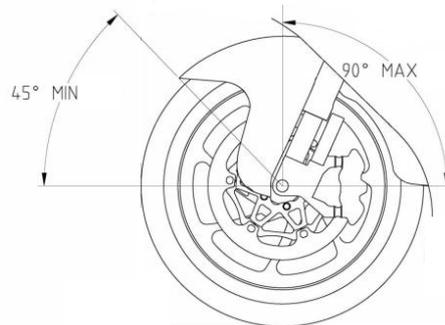
### **B.4.2 Lower fairing**

- B.4.2.1 The lower fairing must be manufactured to contain, in case of an incident in the engine, at least half of the total oil and/or the engine's cooling fluid (minimum 2.5 litres). In prototypes of the Category MotoStudent Electric this rule applies only to those prototypes that have any system incorporating fluids (such as cooling or transmission. Suspension or brake systems are not considered).
- B.4.2.2 The lower fairing must include a hole with a diameter of 25mm, located in the lowest part of the fairing. This hole must remain closed with a tap in dry conditions and must only be opened in case of rain. This empty tap must be wire-sealed to prevent loss of caps or the fall of these to track on failure of closing

### **B.4.3 Mudguards**

- B.4.3.1 The use of mudguards is not compulsory

B.4.3.2 In case of installing a front mudguard, it cannot cover more than  $135^{\circ}$  of the wheel circumference measured from the rear part of the tyre; the origin of the angle being on the horizontal line crossing the wheel shaft.



B.4.3.3 The rear rim cannot be covered in more than  $180^{\circ}$ .

#### B.4.4 Protection against trapping

B.4.4.1 If by design, the swingarm does not cover the inferior part of the chain or transmission belt, a guard must be fitted in such a way as to prevent trapping between the lower drive chain run and the final drive sprocket.

### ARTICLE 5: STEERING: HANDLEBAR AND FOOTRESTS

#### B.5.1 Handlebars and manual controls

B.5.1.1 The use of handlebars or semi-handlebars made of light alloys, such as magnesium or titanium is not allowed.

B.5.1.2 The supports of the handlebar or semi-handlebar must be designed so as to minimise the risk of a fracture in case of a crash.

B.5.1.3 Minimum radius of 2 mm must be used at the parts that constitute the handlebars and their anchorages.

- B.5.1.4 The throttle must include an auto return feature in order to make sure that the throttle will be shut down whenever the rider lets it go.
- B.5.1.5 The manual lever for clutch is free, provided the distance between the pivot point and the outer end not exceed 200mm and edges and terminations are rounded.
- B.5.1.6 Installation of a front brake lever protection is mandatory. This protector must protect the lever from being accidentally activated in case of contact with another motorcycle. In addition to specific protections fixed to the handlebars, a fairing extension sufficient to cover the brake lever (in front view) will also be accepted as protection.



**Examples of front brake lever protections**

- B.5.1.7 The electric ignition button must be located on the handlebar.

## **B.5.2 Footrests and their controls**

- B.5.2.1 The footrests can be fixed or folding type. In case of folding type must be fitted with a device that will make them return to their normal position as well as avoid any easy folding during the race.
- B.5.2.2 The end of each footrest must present round ends, until a minimum spherical radius of 8mm.
- B.5.2.3 It is recommended the installation of a tap at the outer end of footrests, made of aluminium, plastic, Teflon® or any other equivalent material in terms of strength, permanently fixed
- B.5.2.4 The footrests must be fitted with side protections to avoid the rider's boot to interfere with mobile elements such as the chain or the rear tyre.
- B.5.2.5 The rear brake pedal choice of is free.

B.5.2.6 The choice of the gear shift pedal is free.

## **ARTICLE 6: BRAKE SYSTEM**

The motorcycle must be fitted with a disc brake system both in the front and in the rear shaft.

The Organization will provide within the MotoStudent Kit the following parts of the brake system:

- Front caliper
- Rear caliper
- Front hand master cylinder
- Rear foot master cylinder

Information regarding these components will be provided to all participating teams.

### **B.6.1 Comand and control**

B.6.1.1 Combined brake systems are not allowed. The front and rear systems must be completely independent of each other.

B.6.1.2 The braking system for the front wheel should be commanded by a hand lever installed next to the throttle grip on the right handlebar.

B.6.1.3 The braking system for the rear wheel must be commanded by foot by a cam system installed in the area of the right footrest.

### **B.6.2 Discs**

B.6.2.1 The brake discs are free.

- B.6.2.2 The brake discs must be made of steel alloys. The use of carbon or ceramic compound brake discs is strictly forbidden.
- B.6.2.3 The use of discs with inner ventilation is forbidden.
- B.6.2.4 Brake discs must be installed on front and rear tires.
- B.6.2.5 Installation of brake disc spacers between the rim and the disc is permitted.

### **B.6.3 Callipers**

The use of the brake callipers provided by the Organisation, both for the front and the rear shaft, is compulsory.

- B.6.3.1 The rear brake caliper must be installed fixed to the swing arm and the minimum quality of the screw shall be 8.8 according to the EN ISO 898-1 standard
- B.6.3.2 The support of the rear calliper can be fitted to the swing arm by means of welding, screws or helicoil.
- B.6.3.3 It is allowed to mount the rear caliper over a non-fixed support system placed by the rear wheel axle, provided that the system has at least one direct fixing for the swingarm.
- B.6.3.4 The front and rear brake pads are free.
- B.6.3.5 The pins of the front and rear brake pads can be changed. Quick change systems are allowed.
- B.6.3.6 No supplementary cooling pipes on the calliper are allowed.
- B.6.3.7 In order to reduce the heat transfer to the brake fluids, it is allowed to add metallic plates to the brake callipers.
- B.6.3.8 The modification of the body of the brake calipers provided by the Organization is forbidden. The realization of recesses or chamfers is not allowed. Therefore, teams must choose or adapt anchorages for proper installation of the supplied callipers.

#### **B.6.4 Brake pumps**

The use of the brake callipers provided by the Organisation, both for the front and the rear shaft, is compulsory.

B.6.4.1 The brake hoses including with the pumps supplied can be modified or replaced.

B.6.4.2 The activation lever for the front brake pump cannot be replaced or modified.

#### **B.6.5 Brake ducts**

B.6.5.1 The brake lines are free

B.6.5.2 The passage of the line for the front brake calliper must be made ahead the lower steering plate.

B.6.5.3 Quick connectors may be used with the brake lines

#### **B.6.6 ABS System**

The use of an anti-block system (ABS) is not allowed.

#### **B.6.7 Brake fluid**

The hydraulic fluid of the brake system is free.

### **ARTICLE 7: SUSPENSION SYSTEM**

Suspension systems are free configuration, except for the rules set forth below.

### **B.7.1 General aspects**

- B.7.1.1 All active or semi-active suspension systems and/or electronic controls of any type for the suspension, including those that control the height adjustment are forbidden.
- B.7.1.2 The settings of the suspension and the steering dampers can only be made manually and by means of mechanic/hydraulic adjustments.
- B.7.1.3 The Organization shall not accept the participation of a motorcycle which suspension system is determined to be dangerous for the participation in track tests.

### **B.7.2 Front suspension**

- B.7.2.1 Front suspension system of any kind are permitted: conventional fork, inverted fork, Telelever, Duolever, front swingarm, etc.
- B.7.2.2 Front suspension dampers may not mount external tanks or bottles or annexed to the main bottle, whether attached to the main body or communicated by tubes.
- B.7.2.3 Pressurized front suspension dampers, with air/gas preload cartridge, are not allowed.
- B.7.2.4 The front suspension assembly may have mechanical or hydraulic adjustment systems, such as spring preload, compression, extension or rebound regulation.
- B.7.2.5 Any front suspension adjustment system must be integrated into the fork body itself. External control systems communicated by means of hoses, cables, etc. are not permitted.

### **B.7.3 Rear suspension**

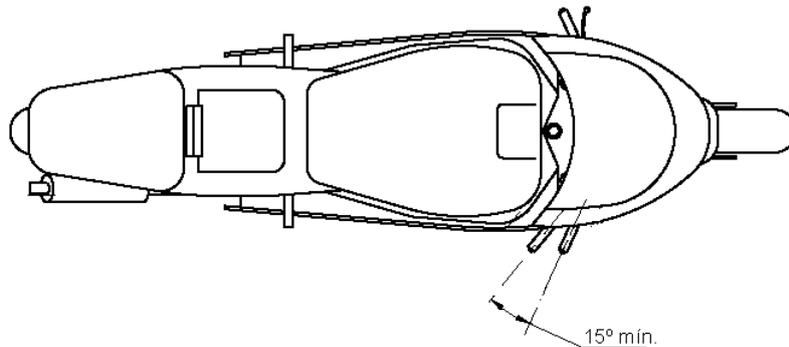
- B.7.3.1 Rear suspension dampers must be of conventional type, without external or annexed tanks or bottles, whether attached to the main body or communicated by tubes.

- B.7.3.2 The rear suspension assembly may have mechanical or hydraulic adjustment systems, such as spring preload regulation, compression, extension or rebound regulation.
- B.7.3.3 Any rear suspension adjustment system must be integrated into the shock absorber body itself. External control systems communicated by means of hoses, cables, etc. are not permitted.
- B.7.3.4 The installation of rear shock absorbers of adjustable length is prohibited.

## ARTICLE 8: STEERING SYSTEM

### B.8.1 Restrictions and geometry

- B.8.1.1 The minimum turning angle of the steering must be  $15^\circ$  measured on either side of the longitudinal axis of the motorcycle..



- B.8.1.2 The turning angle must be limited with stoppers on both sides. These stoppers should be made of nylon, aluminum or materials of similar hardness. Neither the chassis, or any other part of the bike may act as a steering stopper.
- B.8.1.3 There must not be any element interfering in a tolerance of 30mm around the handles of the handlebars and actuators, all along the steering stroke. The aim is to avoid damage to the hands and fingers of the rider in case of a crash.

## **B.8.2 Steering dampers**

B.8.2.1 The fitting of steering dampers is allowed.

B.8.2.2 The settings of the steering dampers can only be made manually and by means of mechanic/hydraulic adjustments.

B.8.2.3 The steering damper cannot act as a device that limits the turning angle.

## **ARTICLE 9: RIMS AND TIRES**

### **B.9.1 Rims**

The use of the rims provided by the Organisation within the MotoStudent Kit is compulsory.

The sizes of the rims will be:

Front rim: 2.5"x17"

Rear rim: 3.5"x17"

Technical documentation and designs of the supplied rims will be supplied by the Organization to the teams registered in the Competition.

B.9.1.1 The use of nylon protectors at the ends of the shafts for possible crashes is allowed. These protectors must be rounded, with a diameter that is equal or larger than the used shaft.

B.9.1.2 The ends of the wheel shafts cannot protrude more than 30mm from their housing. Possible nylon protectors are not considered in this measure (see Art.B.9.1.1).

B.9.1.3 The machining or adaptation of the rims supplied by the Organization is not allowed, not even in the shaft accommodation. The only modification allowed is the repainting.

B.9.1.4 The rims will include an ID hologram of the Competition that cannot be removed or damaged. In case of repainting the rim this hologram must be covered so that it remains visible, and it cannot be covered not even with transparent varnish.

## **B.9.2 Tires**

Only those tyres supplied by the Official Tyre Supplier of the respective competition year can be used at MotoStudent. The Organization will supply a set (front and rear) of dry-condition slicks to each team within the MotoStudent Kit.

The technical information regarding the official tire set will be sent to all teams participating in the Competition.

B.9.2.1 Should the team wish to have more tyres, both for dry and wet conditions; they will be able to purchase them through the Organisation. The tire mounting during the Final Event will be limited to 1 additional set to the supplied initially.

B.9.2.2 The use of tire warmers is allowed.

## **ARTICLE 10: ELECTRONIC SYSTEMS**

### **B.10.1 Driving assistance electronic systems**

B.10.1.1 It is forbidden to use electronic control or assistance systems that provide for a clear riding advantage, such as traction control, ABS, anti-wheelie systems, etc..

### **B.10.2 Information systems for the rider**

B.10.2.1 The information systems and alerts in the dashboard for the rider are free.

### **B.10.3 Data recording**

Está permitido el uso de sistemas de adquisición de datos relativos a parámetros de motor, dinámica de la motocicleta y comportamiento del piloto.

B.10.3.1 The systems allowed to be used are commercial systems or systems adapted from other types of vehicles.

B.10.3.2 The free use of all types of sensors is allowed, provided that its installation does not affect any rule of these Technical Regulations.

B.10.3.3 The software used may be of a commercial type or self-created.

B.10.3.4 The live reading systems of telemetry are prohibited. The data acquisition may only be read at the stops in box.

B.10.3.5 All components and wiring of the data acquisition system must be properly fixed and placed in safe areas.

### **B.10.4 Transponder**

Prior to performing the MS2 tests during the Final Event, the Organization will supply a transponder to all the teams to be installed on the front of the bike.

B.10.4.1 To receive the transponder, at the time of the delivery, the team must leave a deposit of 50€ to the Organization, which will be returned if there is no damage or accident by way misuse at the end of the test.

### **B.10.5 On-board cameras**

For the use of on-board cameras during the tests, teams must request permission previously to the Competition Organization.

B.10.5.1 The installation of on-board cameras during MS2 tests must be approved by both the Technical Organization and by the Race Direction.

B.10.5.2 The installation of on-board cameras will only be possible during the dynamic tests 1, 2, 3 and 4 of the MS2 Phase. On-board cameras are not allowed to be installed during practice sessions and races.

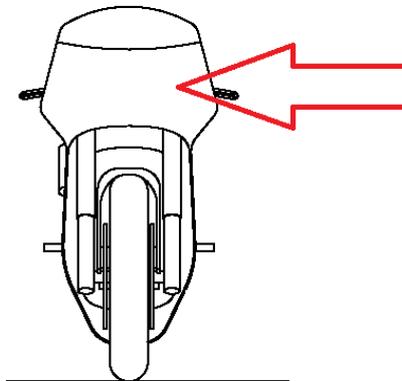
B.10.5.3 In case of installing on-board cameras for the tests described in Art.B.10.5.2, the Technical Staff of the Organization must verify and authorize beforehand the correct installation.

## ARTICLE 11: IDENTIFICATION, ADVERTISING AND COMPETITION NUMBERS

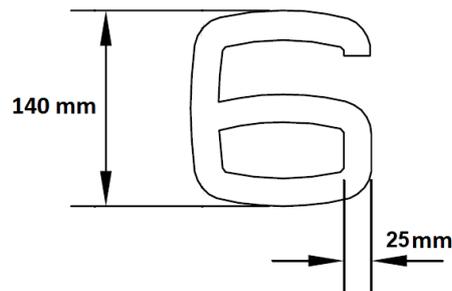
### B.11.1 Numbers

Each motorcycle must carry 3 identifying competition numbers on the fairing.

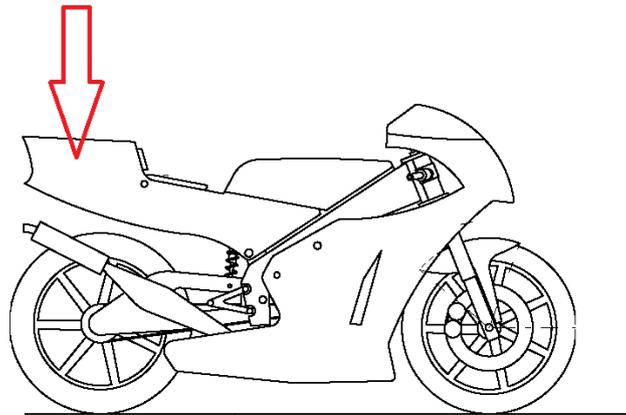
B.11.1.1 The front number must be placed on the front part of the fairing. It may be located in the central part or lopsided, provided that be perfectly legible.



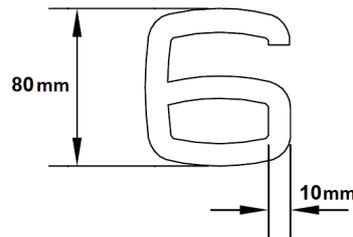
B.11.1.2 In the front number, the minimum dimension of each character must be 140mm in height and the minimum stroke width of each character must be 25mm. The minimum distance between characters must be 10mm.



B.11.1.3A competition number must be placed on either side, to be precise, on the rear side of the fairing (tail).



B.11.1.4In the side numbers, the minimum dimension of each character must be 80mm in height and the minimum stroke width of each character must be 10mm. The minimum distance between characters must be 5mm.



B.11.1.5The numbers must be totally black color. No combination of colors is allowed.

B.11.1.6The typography used for dorsal numbers is free, as long as the Technical Staff of the Organization considers it legible. The inclusion of graphics or logos in the number is not allowed.

B.11.1.7The background behind the numbers should be a continuous homogeneous white area, and shall cover an area encompassing at least 25 mm around the numbers.

B.11.1.8The only numbers to be used are 1 to 99, excluding number 13..

B.11.1.9Each team will be responsible for placing the competition number on the motorcycle.

B.11.1.10 The competition number will be chosen by each team, being granted the choice by order of Registration in the Competition. Numbers 1, 2 and 3 will be reserved exclusively for the teams representing the finalist universities in first, second and third place respectively in the global ranking MS1 + MS2 of the IV International Competition MotoStudent 2015-2016.

## B.11.2 Identification

B.11.2.1 The name of the represented university, its logo or its initials must appear on all prototypes, occupying an area with a minimum height and width of 100mm.

B.11.2.2 There must be a space on the frame for the inspection labels (static, administrative and dynamic inspections). The labels will be added on the right part of the bike (On way direction), and they must be visible with the mounted fairing. There will be 3 rectangular labels with a maximum size of 4 x 5 cm.



Examples of inspections labels

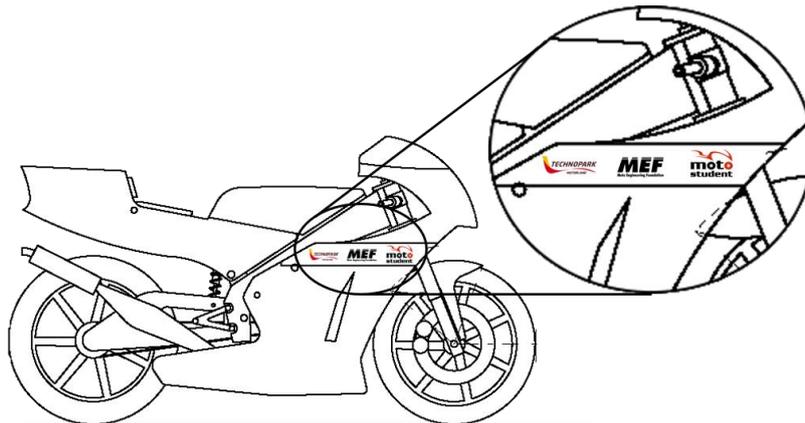
B.11.2.3 Every prototype must have an identifying number engraved in the frame. The said number/code will be provided by the Organisation and engraved by the team on the left side of the bike, and must be perfectly visible with the fairing fitted.

B.11.2.4 None of the identifying elements of the components provided by the Organisation can be covered with paint or adhesive film.

### B.11.3 Competition Logos and Advertising

B.11.3.1 In the final design of the prototype, all participating teams must include in the upper part of the side fairing a strip which must meet the following specifications:

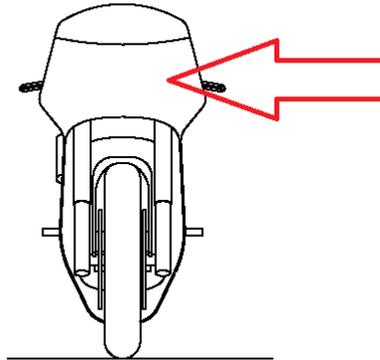
- The strip should be white.
- The MotoStudent, MEF and TechnoPark Motorland logos must be included on the strip in the original colors. The design of these logos will be previously provided by the Organization to all teams.
- This strip must cross from the rear of the side fairing to the front. The minimum height of this white strip will be 70mm and the length will be defined by the chosen design of fairing . The inclination is free, although it is recommended to position it as horizontally as possible.
- The logos should be arranged in symmetrical order on both sides, in the order of the guiding figure shown below. From the front to the rear must follow the order MotoStudent - MEF - TechnoPark Motorland on both sides.
- The minimum width of the logos will be 50mm.



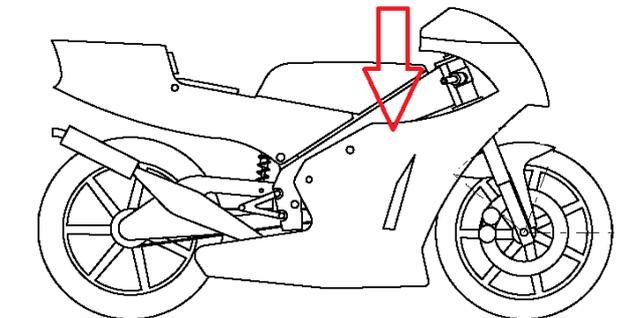
White stripe with compulsory logos

B.11.3.2 Apart from the stripe indicated in Art.B.11.3.1, three spaces should be available to include stickers that will fix the Organization. These adhesives will have a maximum area of 200mm wide x 150mm high and will be provided by the Organization. Its location will be:

- A sticker in the front part of the fairing, near the front number.



- A sticker on each side of the fairing at the top front zone.



B.11.3.3 Is strictly forbidden to include advertising of alcoholic drinks or tobacco on the bike or any other corporate environment of the team.

B.11.3.4 Is strictly forbidden to include advertising or other messages that violate human dignity (violence, xenophobia, racism, intolerance, etc.), or that may offend the sensibilities of some people, both on the bike as in any other corporate environment of the team. Likewise, the Organization reserves the right to review and analyze the advertising content and ban it if it is considered appropriate.

## ARTICLE 12: RIDER EQUIPMENT

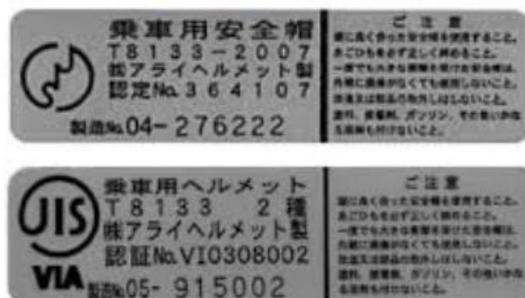
### B.12.1 Helmet

B.12.1.1 The rider must wear a helmet that meets any of the following certifications or equivalent:

- Europe: ECE 22-05 'P'



- Japan: JIS T 8133: 2007 / JIS T 8133:2015



- USA SNELL M 2010 / SNELL M 2015



B.12.1.2 Helmet must be of integral type, for speed track use. The use of a "motocross" type helmet is prohibited.



B.12.1.3 The use of disposable screen covers is allowed (tear-off).

B.12.1.4 The screen must be made of a shatterproof material.

B.12.1.5 The helmet must be well fastened and adjusted during the MS2 tests.

## B.12.2 Safety clothing

B.12.2.1 The rider must be fitted with a whole one piece suit, preferably made of leather or other great resistance material, which cover full torso and extremities, and provides special protection of elbows and knees.



B.12.2.2 The use of suit with backbone protector is recommended.

B.12.2.3 The use of boots of leather or similar material protection is mandatory.

B.12.2.4 The use of leather gloves is mandatory with protections for fingers.

B.12.2.5 The use of underwear homologated for competition is recommended.

## **V International Competition MotoStudent**

### **SECTION C: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY "MOTOSTUDENT PETROL"**

## **ARTICLE 1: ENGINE**

The Organization will supply an internal combustion engine common for the teams entered in the Category “MotoStudent Petrol”

### **C.1.1 Sealing**

The use of the engine provided by the Organisation is compulsory. The engine provided by the Organisation will be sealed and it is strictly forbidden to manipulate it. Any broken or damaged seal shall be reason to declare a technical nonconformity.

C.1.1.1 In case of breakdown or malfunction of any internal part to which the team is not allowed to access, the team shall inform the Organisation, who shall take the convenient steps.

### **C.1.2 Features of the engine**

Technical information about the engine will be sent by the Organization to all the teams registered in the Competition.

C.1.2.1 The engine supplied by the Organization will have a displacement between 240cc and 340cc.

C.1.2.2 The engine delivered by the Organization shall have an internal liquid cooling system

### **C.1.3 Crankcase and engine block**

C.1.3.1 Modifications in the crankcase are not allowed, not even in its covers.

C.1.3.2 Modifications in the engine block are not allowed, not even in its anchorages. The frame supports for the engine should be designed according to the original geometry.

C.1.3.3 Modifications in the original cooling ducts of the engine are not allowed. The external cooling system should be developed according to the original cooling ducts of the engine.

C.1.3.4 Modifications in the intake and exhaust housing of the engine are not allowed. Intake and exhaust systems should be developed according to the original geometry of the engine.

#### **C.1.4 Fuel supply system**

C.1.4.1 The original fuel supply system of the provided engine can be replaced or changed. Either carburetion or injection systems are allowed.

C.1.4.2 The use of ceramic carburetors is forbidden.

C.1.4.3 Only one throttle control valve is allowed, which must be exclusively controlled by mechanical elements and shall only be handled by the rider.

C.1.4.4 The fuel injector must be installed before the admission valves of the cylinder. Direct injection into the combustion chamber is not allowed.

C.1.4.5 It is allowed to install only one injector.

C.1.4.6 The installation of a unique fuel pump is allowed. There are no restrictions on the type of pump to be installed.

#### **C.1.5 Modifications**

C.1.5.1 Any change or modification over the engine that is not specified in these Regulations is not allowed.

C.1.5.2 In case of a dispute about these changes, the decision of the Organization will be final.

## ARTICLE 2: INTAKE

### C.2.1 Intake pipes

The composition, dimension and position of the air intake pipes are free, provided that they comply with the dimensional requirements of the general dimensions of the motorcycle.

C.2.1.1 It is not allowed to install mobile devices in the intake system before the intake valves of the combustion chamber, except for the carburettor or injector.

C.2.1.2 The presence of an air-fuel-mix and recycled engine gases is only allowed in the intake pipes. The additional injection of other elements, such as ethanol, methanol, water, etc. is not allowed.

### C.2.2 Intake flap

C.2.2.1 Only one flap is allowed, to be activated only by mechanical means (e.g. cable) handled by the rider. No other mobile elements are allowed in the intake pipe.

C.2.2.2 No interruption of the mechanical connection between the activation of the rider and the throttle is allowed.

### C.2.3 Overpressure systems

The use of "turbo" systems to increase the gas pressure in the intake is forbidden. It is only allowed to make use of the aerodynamics of the motorcycle's movement by means of air intakes.

### C.2.4 Airbox

The design of the airbox is free.

### C.2.5 Air filter

The filter element of the intake air is free.

### C.2.6 Recycling of gases

It is allowed to mount a tank between the cylinder head cover and the airbox, with the only function of collecting excess gases of the engine. No other function is allowed (such as the change of the created pressure) and only the engine vents may be connected between the cylinder head cover, the said tank and the airbox. It must be possible to check this tank and its connections at any time and therefore they must not be mounted hidden behind the frame making them difficult to check.

C.2.6.1 Any breather pipe for engine gases vent must either discharge into this reservoir, over the intake system or, failing that, over a suitable tank enabled for this purpose.

## ARTICLE 3: TANK AND FUEL PIPES

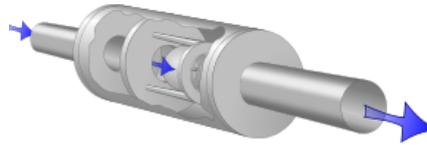
### C.3.1 Fuel tank

C.3.1.1 Fuel tanks, regardless their design or manufacturing material, should be filled with flame retardant foam (popularly known as explosafe / mousse).



Example of flame retardant foam

C.3.1.2 It is mandatory to install a breathing duct in the fuel tank to prevent possible overpressures. This duct should discharge into a suitable tank with a minimum capacity of 200cc. This vent must be provided with a non-return valve.



**Example of non-return valve**

C.3.1.3 In case of "non-metallic" fuel tanks (made of carbon fiber, aramid fiber, fiberglass, polymeric materials, etc.), the installation of a second additional internal deposit of rubber or resin is mandatory. If the non-metallic tanks have FIM approval (demonstrable with the corresponding FIM label), the installation of this internal bladder is not mandatory. The purpose of this inner safety bladder is to prevent the outflow of fuel to the outside in case of rupture of the tank.

C.3.1.4 The exit of fuel from the tank must be above the height of the engine intake valves.

C.3.1.5 The fuel tank cap must be fitted with a threaded opening/closing system.

C.3.1.6 The fuel tank cap must ensure a watertight seal, which prevents the possibility of fuel leaks in the event of a fall.

### **C.3.2 Fuel pipes**

All fuel pipes going from the tank to the carburettor or to the injection system must be fitted with at least one self-closing valve (quick connector), so that if the tank becomes detached from the motorcycle it will be the connector that gets disconnected and no other connections of the pipe. The strength needed to open the connector must be 50% of the strength needed to loosen any other connection or breakage of the pipe material.



**Example of self-closing quick connector**

### **C.3.3 Cooling**

The artificial cooling of the fuel is not allowed. Only the aerodynamic design may be used for cooling the fuel system

### **C.3.4 Pressure**

The fuel pressure must not be over 5.0 bar in any part of the circuit.

C.3.4.1 The refueling operation must be done from a non-pressurized recipient.

C.3.4.2 It is forbidden to artificially pressurize the fuel tank.

## **ARTICLE 4: FUEL AND LUBRICANTS**

### **C.4.1 Fuel**

The fuel set for the Competition must be unleaded 98 octanes (or less). During the Final Event, only the Official Fuel distributed by the Organization may be used.

The technical information and sales prices of the Official Fuel will be published by the Organization to all teams.

C.4.1.1 Any alteration of the fuel with additives or any other treatment is forbidden.

C.4.1.2 At any time during the Event, the Organization may require samples of fuel. In case of not using the Official Fuel the team can be disqualified from the test in process or even from the Competition.

C.4.1.3 It should be taken into account that the composition of the fuel will comply with the chemical requirements established in the European Union. Non-EU countries may find different chemical composition of lubricants, so it is recommended to take this factor into account when setting up and adjusting the motorcycle.

#### **C.4.2 Engine oil**

The lubricating oil to be used is free.

C.4.2.1 The installation of radiators to cool the oil is not allowed.

### **ARTICLE 5: COOLING SYSTEM**

#### **C.5.1 Cooling systems**

C.5.1.1 The design and manufacturing of the external cooling system is free.

C.5.1.2 The number, position, size and composition of the cooling liquid radiators are free, provided that they comply with the dimensional requirements of the general dimensions of the motorcycle.

#### **C.5.2 Cooling fluids**

C.5.2.1 Only distilled water may be used as cooling fluid.

C.5.2.2 The use of additives in the distilled water is forbidden.

### **ARTICLE 6: EXHAUST SYSTEM**

#### **C.6.1 Exhaust system**

C.6.1.1 The exhaust system design is free, provided that it complies with the general dimensional requirements of the motorcycle and the noise regulations.

C.6.1.2 No mobile parts are allowed in the exhausts starting from the exhaust valves of the engine (i.e. valves, deflectors, etc.).

### **C.6.2 Noise**

The maximum noise level allowed for the exhaust is 115 dB/A measured statically at 5,500 RPM.

## **ARTICLE 7: CLUTCH AND TRANSMISSION**

### **C.7.1 Clutch**

The clutch type should be maintained.

C.7.1.1 Clutch disks can be replaced.

C.7.1.2 Clutch springs can be replaced

C.7.1.3 Clutch basket can be replaced.

C.7.1.4 Stock clutch can be modified with limited slip clutch systems.

### **C.7.2 Gearbox**

The original gear box integrated in the engine supplied by the Organization cannot be replaced or modified.

### **C.7.3 Secondary transmission**

C.7.3.1 Only secondary transmission systems by chain are allowed.

C.7.3.2 The exit pinion of the box, the rear wheel rim and the chain are free.

C.7.3.3 Fast gear change systems (quickshift) are authorized.

#### **C.7.4 Modifications**

Any modification of the transmission system or the gearbox which is not mentioned in this section is not allowed.

### **ARTICLE 8: ELECTRIC INSTALLATION**

#### **C.8.1 ECU**

The configuration of the Electronic Control Unit (ECU) of the engine is free.

C.8.1.1 Both commercial and own-design devices can be used.

C.8.1.2 The configuration of the electronic engine management map is free.

#### **C.8.2 Battery**

It is compulsory to fit a battery with an operating voltage of between 8V and 18V.

### **C.8.3 Electric installation**

- C.8.3.1 The preparation of the electric installation by the teams is free.
- C.8.3.2 The use of other commercial installations is allowed.
- C.8.3.3 The type of cable, the design and the wiring are free, provided that they are properly insulated..
- C.8.3.4 The connector type is free. Teams should bear in mind that the electric functioning of the motorcycle must also be guaranteed in wet conditions.
- C.8.3.5 The use of commercial components is allowed (coil, batteries, regulators, connectors, etc.).
- C.8.3.6 All motorcycles must be fitted with a safety stop button on the left-hand side of the handlebar. This button must be highlighted in red to be easily locatable in case of emergency. The button must cut the electric supply of all components of the motorcycle.
- C.8.3.7 The use of a single ignition coil is allowed.
- C.8.3.8 The electrical installation must be perfectly integrated into the whole of the motorbike, it is forbidden leaving distances larger than 15cm of wires unfixed to the chassis.
- C.8.3.9 The length of the cable must be the proper one, so that it is forbidden to coil the excess cable length.
- C.8.3.10 It is recommended to remove the electrical installation as much as possible from the hot spots of the engine, as well as cooling and exhaust systems.

### **C.8.4 Start system**

- C.8.4.1 The cancellation of the electric start system integrated in the Official Engine is forbidden.
- C.8.4.2 In the event of a fault in the electric starter motor, during the start procedure of the race session will not be allowed to start the engine with external starters. Only in the event of a breakdown will it be possible to start the motorcycle by pushing.

## **V International Competition MotoStudent**

### **SECTION D: SPECIFIC TECHNICAL REGULATIONS FOR THE CATEGORY “MOTOSTUDENT ELECTRIC”**

## ARTICLE 1: DEFINITIONS AND GENERAL ASPECTS

### D.1.1 High Voltage - HV, Low Voltage - LV, Volts Direct Current – VDC.

Any circuit with a potential difference above 40 VDC, will be part of the High Voltage (HV) system of the vehicle. Below this voltage, it will be considered as part of the Low Voltage (LV) system.

D.1.1.1 The maximum permitted voltage of the HV system shall be 110 VDC (fully charged batteries).

### D.1.2 High Voltage System – HVS

The High Voltage System (HVS) is made-up of all the electric pieces that form part of the motor, controller, accumulator or any other electric part connected to them. The HVS shall be a High Voltage (HV) system according to the specifications of Art. D.1.1 of these Regulations.

D.1.2.1 The HVS must be electrically separated from the vehicle chassis or ground.

D.1.2.2 The accumulator of the HVS is defined as any cell, battery or supercapacitor (or a group of them), able to store electric energy for the electric propulsion system.

D.1.2.3 The HVS must have a controller device fitted in between the motor and the accumulator, so that there cannot be a direct connection between the motor and the accumulator.

D.1.2.4 It is compulsory to place clearly visible labels indicating danger on housings or areas near the components working with High Voltage (HV). These labels must include the text "HIGH VOLTAGE".



D.1.2.5 The dashboard must be fitted with a display showing the voltage between terminals in the HVS at any given time. The voltage of the HVS may be measured by the Organization in order to check whether or not the value shown on the display corresponds to the real voltage value of the HVS.

### **D.1.3 Ground Low Voltage System – GLVS**

The Ground Low Voltage System (GLVS) is made-up of any circuit or electrical part of the vehicle (chassis) and hence is not part of the HVS.

D.1.3.1 The GLVS must be a LV system, i.e. with a voltage below 40 VDC.

### **D.1.4 Insulation between HVS and GLVS**

D.1.4.1 The HVS and the GLVS shall be galvanically separated.

D.1.4.2 Should a DC/DC converter be used, it will have to comply with this specification.

## **ARTICLE 2: ELECTRIC MOTOR AND POWER DEMAND**

The Organisation will provide a common electric motor for the teams registered at the Category MotoStudent Electric.

### **D.2.1 Sealing**

The use of the motor provided by the Organisation is compulsory. The Organisation will provide a sealed motor and it is absolutely forbidden to manipulate it. Any broken or damaged seal will be reason for technical non-conformity.

In case of breakdown or malfunction of any internal part, the access to which is forbidden, please contact the Organisation to let them take the appropriate measures.

#### **D.2.2 Characteristics of the electric motor**

The technical information about the electric motor will be published by the Organization to all the teams registered in the Competition.

D.2.2.1 The motor supplied by the Organization cannot be modified structurally, not even in its anchors, outer casings or cooling / ventilation system.

#### **D.2.3 Energy regeneration**

Energy regeneration is allowed using the motor as a generator during braking.

#### **D.2.4 Throttle potentiometer**

It is compulsory to include a throttle potentiometer which is controlled from the right-side handlebar of the motorbike. The signal of the potentiometer shall serve to configure the demand of torque or speed from the motor.

D.2.4.1 It is allowed to configure the motor brake with the same potentiometer, mapping it in a range below the acceleration range.

## ARTICLE 3: ENERGY STORAGE

### D.3.1 Permitted storage systems

Any type of battery may be used as energy storage system, except for molten salt batteries (thermal batteries) and fuel cells.

D.3.1.1 The use of supercapacitors is allowed.

D.3.1.2 The voltage supplied by the batteries shall be a maximum of 110 VDC with fully charged accumulator, as described in Art. D.1.1.

D.3.1.3 The connection diagram used shall be submitted to the Organisation (cells in series and in parallel).

### D.3.2 Battery container

All battery cells and supercapacitors that form part of the accumulator must be installed inside a battery container or case.

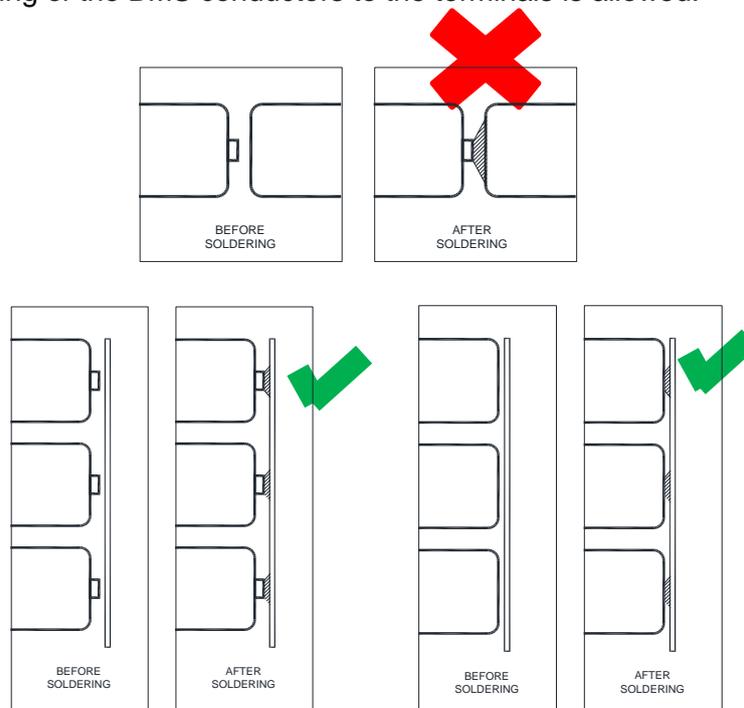
D.3.2.1 The use of several battery containers is allowed. Each one of them must comply with the same prescriptions established for a single battery container.

D.3.2.2 If the battery container is not easily accessible, the Organisation may request pictures of the layout and the assembly at any time.

D.3.2.3 A detailed description of the accumulation system shall be submitted before proceeding with its assembly. Also, it will be obligatory the submission of pictures of the different phases of the assembly of the accumulator, showing all the parts installed. Failure to comply with either of these two requirements may result in the exclusion of the prototype for the MS2 Phase of the Competition (see Art.D.13.1.1).

### D.3.3 Electrical configuration of the accumulator

- D.3.3.1 If the container is made of an electricity conducting material, the terminals of the cells or supercapacitors must be correctly protected and insulated with an electrically insulating material.
- D.3.3.2 If the container is made of an electrically conductive material (metals, carbon fiber, etc.), the body of the cells cannot be directly in contact with the inner wall of the crankcase and an insulation material must be placed. Prismatic cells with a rigid insulating housing are excluded from this requirement.
- D.3.3.3 Each container must include at least one fuse inside, the rated intensity of which must be below the cutting power of the contactor.
- D.3.3.4 Each container must include, at least, a NO-type line contactor, installed in the positive terminal of the accumulator.
- D.3.3.5 The closing of the line contactor, and consequently the presence of High Voltage (HV) at the exit of the accumulator, must be signalled by means of a red light signal located on the dashboard, according to the standards given in Art. D.10.1.1.
- D.3.3.6 It is not allowed the direct connection between cell terminals by means of welding or soldering. Indirect welding or soldering is permitted through a conductive material (plates, plates, cables, fusible wire). The welding or soldering of the BMS conductors to the terminals is allowed.



#### **D.3.4 Mechanical configuration of the accumulator**

- D.3.4.1 The battery containers must be built with a mechanically resistant material and be installed correctly anchored to the chassis.
- D.3.4.2 The battery container may be part of the frame of the motorbike, provided that it complies with the appropriate stiffness and resistance conditions.
- D.3.4.3 The battery containers that are not part of the frame must be protected against side impacts by the motorbike frame.
- D.3.4.4 The cells must be duly protected and fixed to avoid any relative movement (horizontally and vertically) inside the container.
- D.3.4.5 The only communication holes allowed between the inside and the outside of the container are those needed to pass duly insulated conducting cables and those that serve for cooling and ventilation.
- D.3.4.6 Ventilation openings cannot cover a complete side of the container.
- D.3.4.7 Ventilation openings must include some type of filtering element in order to avoid the entry of dust, particles and liquids into the container.
- D.3.4.8 Should a container be completely and tightly sealed, it must include an escape valve to prevent the gas concentration from reaching critical pressure.
- D.3.4.9 The use or adaptation of commercially available containers or cases is allowed, provided that they comply with the characteristics established in this article.

#### **D.3.5 Battery Management System – BMS**

- D.3.5.1 The installation of a battery management system (BMS) is compulsory
- D.3.5.2 The BMS must read the voltage of each cell in order to keep the cells within the voltage limits established by the manufacturer.
- D.3.5.3 The BMS must read the temperature of the cells in their hottest point by means of a compatible temperature sensor. It will be compulsory to read the temperature of at least 4 installed cells, with at least two of them being those corresponding to areas where higher temperatures are expected to be reached.

- D.3.5.4 Should a cell balancing pasive system be used (non-compulsory), resistances must be used capable of dissipating the energy corresponding to the balancing, in such a way that during the balancing period, the temperature indicated by the manufacturer of the resistor (or the BMS) is not overpassed, and does not affect the battery cells or printed circuits nearby.
- D.3.5.5 To improve the balancing speed, it is allowed to activate the artificial cooling of the battery container during the balancing process.
- D.3.5.6 The BMS system must deactivate the vehicle traction if the voltage of one of the cells is discharged to the critical minimum voltage or if the critical maximum temperature of the cell is exceeded, according to the values indicated by the manufacturer. This deactivation is compulsory and must happen at the same as the contactor of the battery accumulator open. (See diagram in Art. D.6.1.2).
- D.3.5.7 In addition to the conditions set-out in Art. D.3.5.10, it is allowed to progressively limit the electric power delivered to the motor until being equal to zero in the critical voltage point of the cell or the maximum temperature of the cell.
- D.3.5.8 The BMS must also deactivate the recharge system when the maximum voltage or temperature levels of the cell are reached. This deactivation may be progressive and/or prompt.

## **ARTICLE 4: CONTROLLER**

### **D.4.1 Motor controller or motor variator**

The motor controller or motor variator is the hardware device that controls the speed and torque of a synchronous motor.

The controller is part of the HVS and can be part of the GLVS.

- D.4.1.1 It is allowed to use any type of commercially available controller.
- D.4.1.2 It is allowed to develop the controller or to adapt any commercially available device.

D.4.1.3 The hardware components shall be compatible with the working voltage and intensity values

D.4.1.4 The controller must comply with all the prescriptions that may apply to it in these Technical Regulations.

#### **D.4.2 Control software**

The configuration of the control software of the motor is free. Both commercially available and own developed software tools may be used for this purpose.

D.4.2.1 The management map for the propulsion system is freely configurable.

D.4.2.2 The implementation of different management maps is allowed.

### **ARTICLE 5: GENERAL ASPECTS OF THE HIGH VOLTAGE SYSTEM (HVS)**

#### **D.5.1 Separation of the HVS and the GLVS**

D.5.1.1 The HVS and the GLVS must be physically separated.

D.5.1.2 There cannot be any contact between the HVS and the frame of the vehicle or any metallic part that is exposed to the outside.

D.5.1.3 If any part or piece of the HVS and the GLVS must be together inside a container, they must respect the minimum separation distance according to the table below, except in the exceptional cases described in Art. D.5.1.4 and Art. D.5.1.5:

Tensión HVS	Distancia de separación
< 100 VDC	10 mm
> 100 VDC	20 mm

D.5.1.4 Distances indicated in Art. D.5.1.3 shall not apply if the components of the HVS and the GLVS are separated by a humidity insulating barrier with a temperature resistance degree of 150 °C or higher.

D.5.1.5 If some parts or pieces of the HVS and the GLVS should be installed in the same PCB board, they shall be placed in clearly differentiated areas, marked as such on the board. They shall be separated by at least 6,4 mm over the surface, 3,2 mm through the air and 2 mm if they are under coating (these distances may not be respected in cases of optocouplers with a rated voltage equal or higher than the voltage of the HVS).

## **D.5.2 Positioning of the HVS**

All components of the HVS must be located inside a reinforced structure that ensures their integrity in case of an accident.

D.5.2.1 The frame of the motorbike may be considered as a protective structure of the HVS, provided that the design and the construction fully protect the system in case of an accident, provided that the requirements indicated in Art. D.3.4 is met.

## **D.5.3 Grounding**

All metal parts of the vehicle that may be able to conduct electricity because they are located less than 100 mm from the HVS or the GLVS must be grounded to the motorcycle.

## **D.5.4 Insulation and cabling**

All components of the HVS must be duly insulated and protected against direct contact.

D.5.4.1 The protection of the HVS must be granted, so that it becomes impossible to access the HVS connections with a cylindrical probe of 100 mm in length and 6 mm in diameter.

D.5.4.2 The HVS connections must be encapsulated in insulating components.

D.5.4.3 The cables or conductors pertaining to the HVS must be non-flammable, grade UL-94V0, FAR25 or equivalent.

#### **D.5.5 Precharge circuit**

Es obligatoria la instalación de un circuito de precarga antes de que cierre el contactor del acumulador.

D.5.5.1 The minimum precharge level must reach 90% of the real voltage of the accumulator, and / or 10 V of maximum voltage difference between terminals.

D.5.5.2 When the disconnection circuit described in Art.D.6.1 opens, the precharge circuit must open as well, so that any new activation manoeuvre of the disconnection circuit always leads to the previous precharging manoeuvre.

#### **D.5.6 HVS activation warning**

A red warning light shall be installed that will remain on while the HVS is active, i.e. while the contactor of the accumulator is closed.

### **ARTICLE 6: DISCONNECTION SYSTEMS AND CIRCUITS**

#### **D.6.1 HVS disconnection circuit**

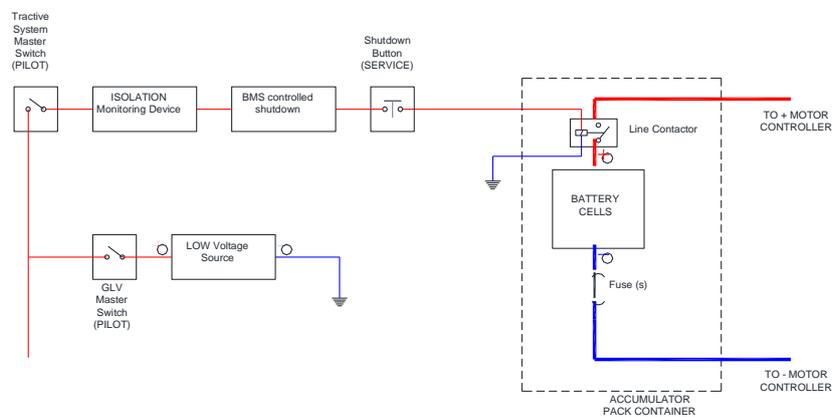
The disconnection circuit manages the opening and closing of the line contactor.

D.6.1.1 The disconnection circuit will consist of at least:

- A Tractive System Master Switch (TSMS).
- A Shut-down button.
- An Insulation monitoring device (IMD).
- The disconnection system managed by the BMS.

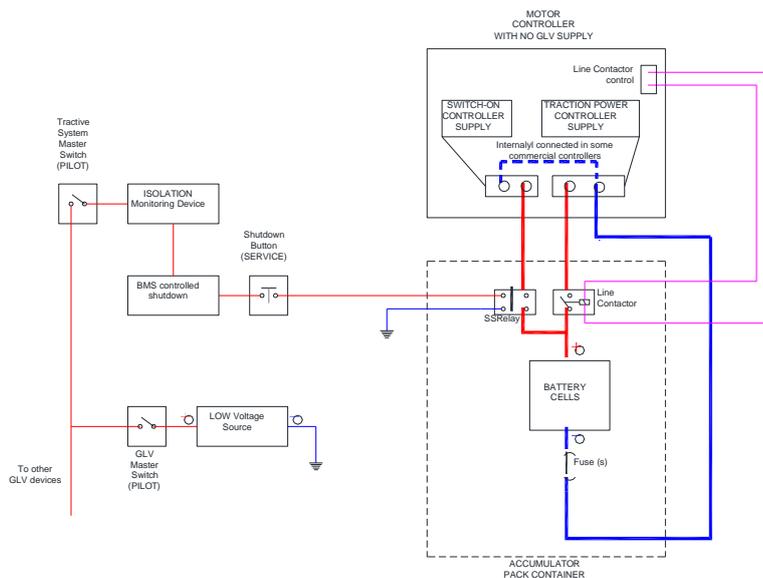
D.6.1.2 The disconnection system must follow one of the systems described below:

- Disconnection system with contactor directly controlled by the disconnection circuit:



**Diagram 1: Contactor directly controlled by the disconnection circuit**

- Disconnection system with contactor directly controlled by the controller:



**Diagram 2: Contactor directly controlled by the controller**

D.6.1.3 Should the coil of the contactor of the battery accumulator be controlled directly by the motor controller (or any other device), the disconnection circuit has to ensure the shut-down of the controller (or the respective device) and consequently the shut-down of the contactor coil, its opening being guaranteed as described in diagram D.6.1.2.

D.6.1.4 Once the disconnection circuit is open (contactor open) as a consequence of the action of any of the designated devices (TSMS, Shut-down button, BMS or IMD), the system will remain in “not ready to ride” condition and the rider will have to reactivate it manually and voluntarily (e.g. restarting the controller), before the disconnection circuit closes again.

## **D.6.2 Disconnection of the GLVS**

To make sure that the GLVS is able to turn on and off independently, a Grounded Low Voltage Master Switch must be installed.

## **D.6.3 Type of switches**

D.6.3.1 The Emergency/Shut-down button(s) must be red mushroom-type push-rotary buttons.



**Example of emergency button**

D.6.3.2 The Tractive System Master Switch (TSMS) must be rotary-type.

#### **D.6.4 Deactivation of the DC/DC converter**

D.6.4.1 Should a DC/DC converter be used as LV energy source, the complete disconnection of the inverter must be ensured to avoid self-consumption

#### **D.6.5 Insulation Monitoring Device (IMD)**

The Organization will provide an insulation monitoring device (IMD) BENDER included in the MotoStudent Kit to ensure a proper electrical isolation between the HVS and the chassis of the prototype.

D.6.5.1 The installation of this insulation monitoring device is mandatory.

D.6.5.2 The proper working of the insulation monitoring device will be checked during the static safety check, as indicated in Art. E.5.1 of these Regulations.

### **ARTICLE 7: FUSES**

#### **D.7.1 HV Fuses**

The circuit on the HV side must be protected by at least one fuse, according to the conditions stated in Art. D.3.3.3

D.7.1.1 The rated current of the fuse shall be lower than the calculated shortcut current, and higher than the maximum service current.

D.7.1.2 If several cell strings are mounted in parallel, each of these strings must be protected with an own independent fuse.

D.7.1.3 The fuse or fuses must be installed inside the battery container or case.

### **D.7.2 GLVS fuses**

All circuits on the GLV side must have a fuse to protect the conductor and the device it is supplying, avoiding their maximum permitted current to be reached.

## **ARTICLE 8: ACCUMULATOR RECHARGING**

### **D.8.1 Chargers**

D.8.1.1 All types of chargers with a rated power minor or equal to 22 kW are permitted (Maximum 32 rated amps in three-phase network side configuration).

D.8.1.2 Serial or parallel configurations of different chargers are permitted provided that the total sum of the unit powers of the chargers does not exceed the power indicated in Art. D.8.1.1.

D.8.1.3 The charger must be fitted with a respective ground conductor which must be duly connected to the case of the charger.

### **D.8.2 Mains connection**

The mains connection can be single-phase (230 VAC, 50 Hz) or three-phase (400 VAC, 50 Hz).

D.8.2.1 The connection of the ground conductor to the socket base is compulsory.

### **D.8.3 Connection to the motorcycle**

The connection between charger and motorcycle must comply with specific minimum safety conditions.

- D.8.3.1 The charging connector located on the motorcycle must be fitted with an automatic or manual shut-down system.
- D.8.3.2 The conductors of the recharging connector present on the motorcycle must be inaccessible when the connector is closed.
- D.8.3.3 The charging connector of the motorcycle must have a tightness degree of IP-65 when closed.
- D.8.3.4 The charging connector must be located in a protected area of the motorcycle to prevent damages due to possible crashes, contacts or impacts.

#### **D.8.4 Recharging process**

The recharging process of the accumulators must be carried out in a safe way.

- D.8.4.1 During the recharging process of the motorcycle during the Final Event it will be compulsory to have at least one team member present, who is familiar with every detail of the recharging process.
- D.8.4.2 The team member in charge of the recharging process must be prepared to face any kind of action during the process (manual disconnection, deactivation, etc.) in order to insulate the vehicle from the network in case of any contingency.
- D.8.4.3 A fire extinguisher for electric fire (extinguishing agent CO<sub>2</sub> or similar) must be located at a distance of less than two meters from the motorcycle during the recharging manoeuvre.
- D.8.4.4 The BMS must be fitted with a recharge control device, as described in Art. D.3.5.

## **ARTICLE 9: GENERAL INSTALLATION AND CABLING**

### **D.9.1 General insulation**

D.9.1.1 All conducting cables and connectors must be covered with insulating material, except for direct ground connections.

D.9.1.2 The areas, elements and systems with a high electric risk must be correctly protected against possible contact and manipulations. It is recommended to install rigid insulating housings for a higher protection.

### **D.9.2 Dimensioning**

D.9.2.1 All conducting cables and connectors must be correctly dimensioned according to the requested current levels.

### **D.9.3 Protection against humidity**

D.9.3.1 The components of the propulsion system shall be highly protected against humidity. The recommended protection degree is IP65.

### **D.9.4 Wiring**

D.9.4.1 The cable length must be exact, and therefore it is not allowed to roll excessive cable lengths.

D.9.4.2 The passage of the electric installation through possible hot points must be avoided as far as possible.

D.9.4.3 The electric installation must be perfectly well integrated into the motorcycle assembly, and the distance between cable fixing points shall not be longer than 15 cm.

D.9.4.4 Any possible interference between the electric installation and any mechanic system of the motorcycles must be taken into account and avoided, in any possible geometry range (during the complete route of the steering, suspensions, etc.).

## **ARTICLE 10: CONTROL AND CONTROL ELEMENTS**

### **D.10.1 Dashboard**

The dashboard shall be perfectly visible for the rider when in riding position.

D.10.1.1 The dashboard must include a red warning light that must be lit when the HVS is activated, as indicated in Art. D.5.6.

D.10.1.2 The dashboard must have a display showing the voltage between HVS terminals at all times, as established in Art. D.1.2.5.

### **D.10.2 Control elements**

D.10.2.1 The rider must be able to activate, reactivate or reset the electric propulsion system completely, without the help of other people and without the need to get off the motorcycle, from the standard riding position.

### **D.10.3 Shut-down button**

This article affects the shut-down button(s) described in Art. D.6.1 of these Regulations.

D.10.3.1 The shut-down button must be installed in a place in which it is protected against a crash or accidental contact by the rider, but at the same time accessible and recognisable for the track marshals.

D.10.3.2 The shut-down button may not be installed on any quick-removable component, such as the fairing. It should be installed preferably on supports that are fixed to the chassis.

D.10.3.3 If the installation of the shut-down button on the side of the motorcycle is under consideration, there must be two buttons, i.e. one on either side.

D.10.3.4 The installed shut-down button or buttons must have red colour.

## **ARTICLE 11: TRANSMISSION**

### **D.11.1 Types of transmission**

The configuration of the transmission system used for the “MotoStudent Electric” category is free.

D.11.1.1 Any type of primary transmission system is allowed: gearbox, CVT variator, etc.

D.11.1.2 Direct transmission between the output shaft of the motor and the rear wheel is allowed.

D.11.1.3 There are no limitations as regards the installation of clutch elements between components of the transmission system.

### **D.11.2 Secondary transmission**

D.11.2.1 There is no limitation as regards the type of secondary transmission used: chains, belt, etc.

D.11.2.2 Any element of the transmission that might imply a trapping risk for the rider must be covered with a rigid housing.

## **ARTICLE 12: COOLING**

### **D.12.1 Overview of the cooling systems**

D.12.1.1 The design of the cooling system for the different components is free.

D.12.1.2 The cooling of components by air and by liquid cooling systems is allowed.

### **D.12.2 Air cooling systems**

D.12.2.1 The cooling by means of aerodynamic air conduction is permitted.

D.12.2.2 Forced-air cooling by means of fans or other methods of air impulsion or extraction is allowed.

### **D.12.3 Liquid cooling systems**

D.12.3.1 Only distilled water may be used as cooling liquid.

D.12.3.2 The use of additives in the distilled water is forbidden.

D.12.3.3 The number, location, size and composition of the cooling liquid radiators are free, provided that they comply with the dimensional requirements of the general measurements of the motorcycle.

## ARTICLE 13: DOCUMENTATION OF THE VEHICLE

### D.13.1 Documents to be submitted

The Organization will require to the teams from the Category MotoStudent Electric, throughout the Competition, to submit documentation about the electric propulsion system. The Organization will establish a series of mandatory documentation deliveries, reflected in the Official Competition Calendar reflected in Art. A.6.1, in which information will be requested regarding the electric propulsion system.

D.13.1.1 The specific milestones for the teams of the Category MotoStudent Electric will be:

- MSE Special Milestone 1: Complete electric scheme (From 01/11/2017 to 30/10/2017): Complete electric scheme (HVS, LVS, BMS, cells electric scheme), including all active and passive parts.

- MSE Special Milestone 2: Battery accumulator features (From 01/02/2018 to 28/02/2018): General description of the energy accumulator, including: 3D design of the container, cells, mechanical protections, list of electrical components (identification of all elements of the electrical diagram: commercial names, measures and indication of its location in the motorbike). Connection diagram used in the accumulator (series and parallel cells), total number of cells and rated and maximum voltages of the complete accumulator. Data sheet of the cells or supercapacitors used.

- MSE Special Milestone 3: Description of the accumulator assembly (From 01/05/2018 to 31/05/2018): Presentation of the assembly of the batteries container with diagrams and pictures of its assembly and wiring. Pictures of the definite set assembled.

- MSE Special Milestone 4: Description of track tests (From 01/07/2018 to 31/07/2018): Summary of the tests phase carried out with the prototype and video presentation of the electric motorbike already running autonomously (although it is still in the test phase).

D.13.1.2 Failure to submit the documentation requested by the Organization will mean the non-compliance of the scrutineering, and therefore, the exclusion of the teams from the Phases MS1 and MS2.

D.13.1.3 For safety reasons, the Technical Department of the Organization may require technical information additional to that described in this article if it considers it for the inspection of one or more specific prototypes.

## **V International Competition MotoStudent**

### **SECTION E: SCRUTINEERING**

## ARTICLE 1: OBJECTIVE AND METHODOLOGY

### E.1.1 Objective

The objective of the pre-event scrutineering is to check that the motorcycles that have been submitted to the Competition by the participating teams comply with the specifications in terms of performance and safety as established in the General Technical Regulations (Sections B, C and D).

E.1.1.1 The pre-event scrutineering will not score towards the MotoStudent Competition, but it may entail the exclusion if any deviation from the regulations is detected or if the motorbike is not considered as safe enough to take part in the tests.

E.1.1.2 The pre-event scrutineering will be carried out by Federative licenciate scrutineers and qualified Technical Staff of the Organisation.

E.1.1.3 In case of dispute over the non-compliance of the rules reflected in the Technical Regulations, or the safety of the bike on track, the decision of the Technical Staff of the Organization will be definitive.

### E.1.2 Responsibility of the teams

Teams are responsible for making sure that their motorcycle complies with all the rules established in the Competition Technical Regulations.

E.1.2.1 When presenting the motorcycle for scrutineering, the team acknowledges that they have made sure that the motorcycle complies with the regulations established by the Organisation.

### E.1.3 Procedure

The scrutineering consists of three phases:

- Visual Safety check.
- Static safety check on test bench.
- Dynamic safety check on the track.

## **ARTICLE 2: VISUAL SAFETY CHECK**

### **E.2.1 Application**

The static scrutineering described in this article affect the motorcycles presented for both the category "MotoStudent Petrol" and the category "MotoStudent Electric".

### **E.2.2 Procedure**

The motorcycle will be checked by the scrutineers according to all the rules reflected in the Technical Regulations.

E.2.2.1 The teams may have all spare elements (any component or part of the motorcycle) that they may seem fit. These spare parts must be presented to the Organisation together with the prototype in order to have them verified.

E.2.2.2 The static checks will be carried out in the Technical Control Area.

E.2.2.3 The motorcycle must be presented ready to participate in the MS2 tests, so that, complying all the rules reflected in the Technical Regulations of the Competition.

E.2.2.4 The use of components that have not been checked by the Organisation will entail the immediate exclusion from the competition

E.2.2.5 For the static checks, only 2 team members shall be present in the Technical Control Area. These team members will be in charge of transporting the motorcycle and any type of stand to present the bike in static position for its examination.

E.2.2.6 The presentation of the Technical Passport submitted together with the corresponding MotoStudent Kit of each team shall be required, as defined in Article A.4.4.8 of the present Regulations.

## **ARTICLE 3: STATIC SAFETY CHECK ON TEST BENCH**

### **E.3.1 Application**

The scrutineering on test bench described in this article affect the motorcycles presented for both the category "MotoStudent Petrol" and the category "MotoStudent Electric".

### **E.3.2 Procedure**

The motorcycle will be submitted to checks on a test bench. The tests to be carried out are detailed below.

E.3.2.1 The safety checks on the test bench will be carried out in the Technical Control Area.

E.3.2.2 The safety checks on the test bench will be carried out right after the static safety check.

### **E.3.3 Structure test bench**

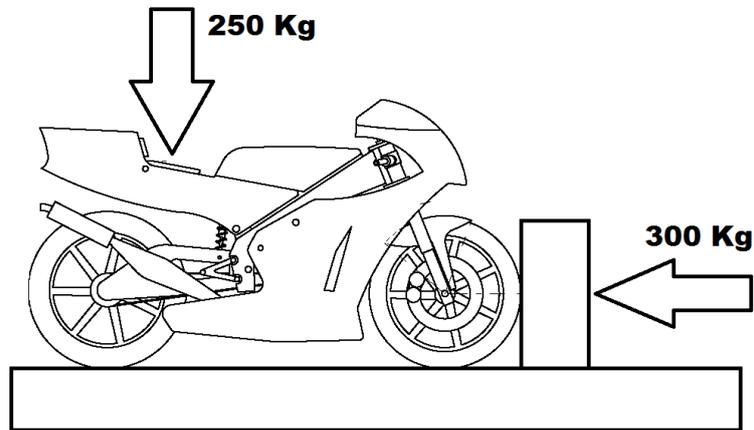
If the Organization considered necessary, the motorcycle can be subject to horizontal and vertical forces on the test bench in order to check the rigidity of the frame, the correct assembly and the working of suspensions.

E.3.3.1 The following forces will be applied on the motorcycle:

- Progressive horizontal load on the front wheel: 300 kg
- Progressive vertical load on the seat: 250 kg

E.3.3.2 These loads will be applied alternately and progressively, verifying that in compression situation there is no interference between elements, as well as that all the systems that integrate the cycle part of the motorcycle work properly. When removing the force, the scrutineers will verify that the original geometry has not undergone deformations, nor that no crack has appeared in the structural components or joining elements. In order for the bike to be considered fit in this test, must comply with the provisions described.

E.3.3.3 Graphic description of the test:



**Forces Diagram**

**E.3.4 Brake check**

The correct working of the front and rear brakes is going to be checked on a roller brake tester.



**Brake check**

E.3.4.1 In order for the motorcycle to be considered as having passed this test, it shall provide brake strength values above the following figures:

- Front: 0.30 kN

- Rear: 0.25 kN

E.3.4.2 In order for the bike to be able to meet the braking values, it is recommended to carry out the brake check test with the brake pads and brake discs with a slight pre-working. Certain disc assemblies and pads newly installed may give efficiency problems due to coatings, adaptations between surfaces, etc.

### **E.3.5 Approval**

E.3.5.1 If the motorcycle passes the static and test bench checks, it will be marked with the respective sticker and taken to the dynamic checks on the track



Example of approval sticker

## **ARTICLE 4: SPECIFIC STATIC TECHNICAL CHECKS FOR BIKES OF THE CATEGORY "MOTOSTUDENT PETROL"**

The present article affects only the bikes presented for the Category "MotoStudent Petrol".

#### **E.4.1 Exhaust noise**

The exhaust noise will be measured.

E.4.1.1 The maximum permitted exhaust noise is stated in Art. C.6.2. of the Technical Regulations.

E.4.1.2 The noise will be measured at approx. 50 cm from the exhaust exit, in the flow direction of exhaust gas, in a place which shall be as silent as possible, with no walls or obstacles within 3m around the exhaust exit.

### **ARTICLE 5: SPECIFIC STATIC TECHNICAL CHECKS FOR THE “MOTOSTUDENT ELECTRIC” CATEGORY**

El presente artículo afecta exclusivamente a los prototipos participantes en la Categoría “MotoStudent Electric” de la Competición. This article does only affect the prototypes participating in the Category “MotoStudent Electric” of the Competition.

#### **E.5.1 Insulation Monitoring Device Test (IMDT)**

A test will be carried out in order to check the correct working of the insulation monitoring device (IMD) defined in Art. D.6.5 of these Regulations.

E.5.1.1 During the test, a 50 k $\Omega$  resistance will be placed between the HV side and the chassis in order to check the correct electric insulation.

E.5.1.2 In order for a motorcycle to pass the test, the measuring system should open the disconnection circuit not later than 30 seconds after it has been connected to the prototype.

### **E.5.2 Insulation Measurement Test (IMT)**

A test will be carried out in order to check the correct working of the insulation between HVS and GLV.

E.5.2.1 During the test, the insulation between HVS and GLV will be measured.

E.5.2.2 In order for a motorcycle to be considered as fit to take part in the Competition, the value measured between both systems must be equal or higher than 100 kΩ.

### **E.5.3 Disconnection Circuit Test**

A test will be carried out in order to check the correct working of the disconnection circuit.

E.5.2.1 The correct working of the Main Switch and of the Shut-Down Button will be checked. Shutting down any of them must open the contactors of the battery accumulator.

E.5.2.2 When shutting down these switches, the voltage shown on the display of the dashboard must be zero.

### **E.5.4 Rain test**

The Organization may carry out a rain test to check the correct insulation of the electric propulsion system in rainy conditions.

E.5.4.1 The motorbike must first be subjected to the Insulation Monitoring Device Test, Insulation Measurement Test and the Disconnection Circuit Test.

E.5.4.2 During this test, the motorbike must be connected, with the drive wheel raised without contact on the ground (on a stand) and in a "non-ready-to-ride" situation.

E.5.4.3 Water will be projected simulating the effect of fine rain over the motorbike in different directions for a minimum period of 60 seconds. Under no circumstances will high pressure jets be projected onto the motorbike.

- E.5.4.4 The test shall be approved if the IMD has not act during the minimum 60 seconds of spray or during the next 60 seconds after the spray has ended. The minimum total duration of the test will therefore be 120 sec.
- E.5.4.5 The Technical Staff will also verify that there is no accumulation of water in areas at risk for the electrical system.
- E.5.4.6 It is recommended to carry appropriated means to dry the motorcycle after the test.

## **ARTICLE 6: DYNAMIC SAFETY CHECK ON THE TRACK**

### **E.6.1 Application**

The dynamic scrutineering described in this article affect the motorcycles presented for both the Category "MotoStudent Petrol" and the Category "MotoStudent Electric".

### **E.6.2 Procedure**

A test rider nominated by the Organization will carry out a series of dynamic tests on the track to check the correct working of the motorcycle.

In order for the motorcycle to be approved for the participation in MotoStudent it shall comply with the following:

- E.6.2.1 The bike must start up and move under its own power
- E.6.2.2 The motorcycle must brake correctly both when riding softly and aggressively.
- E.6.2.3 The motorcycle must be able to carry out a series of turns at different speeds.
- E.6.2.4 The test rider will determine if the bike meets the basic safety requirements to participate in the Competition.

### **E.6.3 Lap around the track**

After having checked the different aspects, the test rider of the Organisation will make a complete lap around the Road Racing Track.

### **E.6.4 Approval**

E.6.4.1 If the motorcycle passes the dynamic test, it will be marked with the respective sticker and the team will be able to take part in the MS1 phase.



Example of approval sticker

## **ARTICLE 7: RECTIFICATION IN CASE OF PROBLEMS**

### **E.7.1 Rectification time**

E.7.1.1 If the motorcycle is considered as "not approved" after the static or dynamic tests, the Organisation will provide for a time period of 45 minutes to allow the team to rectify the failures marked by the Organisation in their own pit garage. After this period of time the motorcycle shall be presented again at the technical garage to verify whether it complies with the regulations or not.

E.7.1.2 If after the second check the motorcycle is still considered as "not approved", the team will be excluded from the MS2 phase but will be able to continue taking part in MS1.

## E.7.2 Favourable solution of problems

E.7.2.1 If the motorcycle is considered as approved after the dynamic test, it will be marked with the respective stickers and the team will be able to take part in the following phases.

## ARTICLE 8: ADMINISTRATIVE CHECKS

Riders must perform administrative checks, in which the Organization will review its documentation is in force and meets all the requirements, as well as the equipment is according to the regulations to participate in the competition. Once approved these aspects it will be granted the corresponding verification sticker.



Example of approval sticker

## **V International Competition MotoStudent**

### **SECTION F: MS1 REGULATIONS**

## ARTICLE 1: OBJECTIVES

The MS1 Phase reflects the evolution of the MotoStudent project for each team along the Competition development. The participant teams must show and explain to the jury the whole prototype design and development project and a supposed case of a serial production project of the designed motorcycle, as well as its launch to the market. This phase intends to be an opportunity for participating students to apply the knowledge acquired during their education in a "real" project, showing the aspects and difficulties that an industrial manufacturing project can entail and how to launch a product into the market.

### F.1.1 Design Scenario

The Design Scenario is the fictitious framework the MS1 Project is embedded in. It focuses the design performed by the teams for a certain supposed but realistic target that is described below:

The MotoStudent Race Challenge: a new International FIM competition has been launched. It consists on racing with MS-derivate motorbikes, in authorized national championships. These bikes have to be based in MotoStudent prototypes, designed, manufactured and sold as per the MotoStudent rules, Each national MS champion teams will compete in a MS world cup final race event in Motorland Aragon.

- F.1.1.1 In this fictitious scenario, the motorbikes compete in national championships, however this is not constraining the market, as any bike can be sold to riders' teams in any country and for any other purpose, provided they comply with the Competition requirements, including the manufacturing conditions and cost approved in the MS1 Regulations.

### F.1.2 General idea of the MS1 project

The project is based on the design, the development and the manufacturing of a racing motorcycle to be commercialized at a certain development cost, to participate in the supposed scenario described in Art. F.1.1

## ARTICLE 2: OUTLINE OF THE PROJECT

### F.2.1 Project Chapters: Design and Development Process description.

Basic Design and Development process shall be organized and structured in order to take into account all the necessary items that make the prototype suits the necessities it is designed for. For this reason, the compulsory contents that MS1 Project shall include are described hereby.

F.2.1.1 MS1 Project shall include the following chapters::

A.- Conceptual Design and Targets

B.- Detailed Design

C.- Prototyping and Validation

D.- Industrial Production

E.- Business Plan

F.- Technological Innovation project

### F.2.2 Chapter A: Conceptual Design and Targets

First stage shall consider the Design Scenario and design targets to be achieved. This chapter has to give answer to two basic questions:

- How the motorbike has to perform?
- Which are the constraints and requirements to comply with?

F.2.2.1 As a guideline, for the development of Chapter A: “Conceptual Design and Targets”: the following inputs should be compiled and integrated into a design specification:

- Competition Regulations
- Team’s know-how (from former projects in their University)
- Available resources each Team has (team size, SW tools, HW, media...)
- Components or systems pre-dimensioning methodologies
- Interfaces, ergonomic and geometrical restrictions
- Market targets and constrains: Any foreseen design requirements for the serial production that might influence the prototype design

F.2.2.2 The purpose of this Stage is to verify whether an idea is technically feasible. Taking into account all the design inputs (refer to Art. F.2.2.1), some Design Decisions have to be taken in order to define the concept of the motorbike that will be built: modes of use, geometry, materials, structural elements, commercial components, not getting into constructive details beyond those strictly needed to define a design basis that will comply with the function and the requirements. A QFD matrix is recommended as an example of a helping technique.

F.2.2.3 The analysis of the different design alternatives for the motorcycle Functional Systems is performed (as an example: type of frame, suspension trim, materials, etc.). Different Technical solutions would result in different physical configurations for Subsystems, Components and Parts. There will be a more positive assessment as more solutions are designed from scratch by the teams.

F.2.2.4 Functional generic systems might be amongst others:

- Structure and suspensions
- Drive line (engine or motor and power transmission)
- Power Control system
- Energy storage system (MotoStudent Electric)
- Fairing

F.2.2.5 In this Chapter A, it is recommended to identify and control some parameters in order to monitor whether the design targets are being met or not. Some examples include: position of COG, minimum weight, ergonomics, performance, cost

F.2.2.6 The minimum sections to be included in Chapter A of the Project shall be:

- A.1. A Market Study
- A.2. A trade off of the different functional systems: frame, suspensions, transmissions, etc.
- A.3. A document with the Load Cases to be used in the structural calculations
- A.4. FEMA and Technical risks assessment
- A.5. A Make or Buy decision for main systems
- A.6. A list of applicable requirements and their degree of compliance at the end of this stage. As an example, the minimum weight estimation and the % of compliance compared with the value given by the Technical Rules
- A.7. Requirement specifications deployed at least to the systems level.
- A.8. Un borrador de diseño 3D, y planos generales mostrando las restricciones geométricas, interfaces y geometría básica A draft of a 3D model showing all the geometrical constraints, interfaces and basic geometry
- A.9. Preliminary Validation Plan, where the strategy to be followed for the testing to be done to systems or components, or the whole motorcycle, shall be reflected, in order to assess whether the design complies with the requirements or not. The aim is to make the prototype reliable enough so it can pass successfully the Final Event tests. The strategy can focus by means of:
  - Analogy validation (for non-critical components and providing justification)
  - Calculations validation (by means of calculation models due correlated)
  - Bench tests, for components or the completed motorcycle
  - Track tests, for the completed motorcycle

### **F.2.3 Chapter B: Detailed Design Stage**

With the outputs from the Chapter A “Conceptual Design and Targets”, Detailed Design Stage focus on the generation of the documentation needed to justify a design that is feasible to be manufactured.

F.2.3.1 The structural integrity of the components under the loading defined in Chapter A is going to be subjected to, is ensured in this phase.

F.2.3.2 The whole documentation needed to build the prototype is generated. This Chapter shall include as a minimum, the following information:

- B.1. Detailed Dynamics and static loads calculations
- B.2. Structural calculations
- B.3. Thermodynamic calculations
- B.4. Performance calculations including aerodynamics if needed
- B.5. Manufacturing documentation (completed drawings and assemblies)
- B.6. Requirements documentation for commercial components
- B.7. Definitive Validation Plan, in order to ensure the right integration of the components and the performance of the completed Prototype Although the complete Prototype will be Assembled and Erected during Validation Stage, certain items could be tested separately at this stage, in order to optimize their design in this phase, so their validation plan should be developed in this Chapter (as an example, a front fork can be tested in a dynamic bench, or an engine in a specific engine bench, even though the frame is not available yet).

#### **F.2.4 Part C: Prototyping and Validation**

Prototyping the model is the process that transforms what was developed in Chapters A and B into a real functional motorbike. Team shall manufacture, purchase, assembly and test all the designed components in order to achieve an integrated and feasible motorcycle.

F.2.4.1 Chapter C: MS1 Project Prototyping and Validation shall reflect the degree of correlation between of the simulations and calculations made at Chapters A and B with the real working conditions of the components.

F.2.4.2 Chapter C shall include a report with the description and results of the different tests made during the manufacturing, assembly and setting of the prototype. The tests to be done can be, as an example:

- Component bench testing in dedicated test benches
- Complete vehicle testing in bench: power tests, wind tunnel, loads rig, etc.
- Complete vehicle testing on a track: different tests with rider
- Previous testing of compulsory scrutineering as published in Section E of the Competition Regulations
- Previous testing of Compulsory MS2 dynamic tests as published in Section G of the Competition Rules.

F.2.4.3 As a consequence of this process of assembly and tests, some re-designs might happen. These shall be documented and justified

F.2.4.4 Final target of this stage is to get into the track with a competitive fully functional motorbike that will be the starting point to develop the Industrial Production project (Chapter D), and the Business Plan (Chapter E).

F.2.4.5 Regarding the indicated requirements, contents of this Chapter, as a minimum, shall be:

C.1. A Deviations Report: where all the issues detected at the time of manufacturing the prototype that might cause minor design changes or put in compromise performance or requirements compliance with respect to Chapters A and B, are recorded. These changes shall be developed and justified, and subjected to Organization approval before the prototype is presented at the Final Event.

C.2. Validation Report: where the results of any test prior to MS2 competition and the compliance with the requirements in the Regulations has to be recorded.

C.3. Budget for the prototype manufacturing.

## F.2.5 Chapter D: Industrial Production

This chapter shall develop a supposed plan to take to serial production the developed motorcycle, complying with the fictitious targets given in Art. F.1.1. The Prototype design shall then be adapted to additional profitability and serial manufacturing requirements.

F.2.5.1 With the aim of keeping as equal as possible the technical level of the MotoStudent Race challenge motorcycles, the manufacturing costs shall be:

- Category "MotoStudent Petrol", manufacturing cost of: 4.850 €/unit
- Category "MotoStudent Electric", manufacturing cost of: 9.750 €/unit

F.2.5.2 Manufacturing costs established in Art.F.2.5.1 are unitary costs for the units manufactured under the fictitious scenario of the serial production. Real prototype development and manufacturing costs are not fixed or limited.

F.2.5.3 The specifications to be complied with by the production motorcycle must be the same as those stated in the Technical Regulations of the Competition, with the exception of those affecting the components provided by the Organization for the compulsory use in the real prototype. In the case of the serial production motorbike these parts will be of free election, although their costs are fixed in the table of Art.H.1.2

F.2.5.4 The characteristics that the supposed serial production motorcycle shall keep from the real prototype are:

- Geometry: wheelbase, position and angle of swingarm, CoG position direction, distance between tripleclamps, suspensions travel, suspensions geometrical design, tyre and rims dimensions
- Brakes: discs dimensions and position
- Structural components design: frame, subframe, swing arm, triple clamps, shafts.
- Bodywork geometries
- Suspensions concept
- Power transmission concept

F.2.5.5 The features that the serial production motorbike can change from the prototype are:

- Any component in the list of components given in Art.H.1.2, provided they comply the the costs fixed by the Organization.
- Any change needed to adapt the manufacturing method to the serial manufacturing process (fixation points...)
- Materials, if not affecting structural integrity. Otherwise, a justification must be provided.
- Geometry regulation features, if not affecting structural integrity. Otherwise, a justification must be provided

F.2.5.6 Minimum contents of Chapter D (Industrial Production) shall be:

- D.1. Company definition and targets. Mission and Vision.
- D.2. Marketing strategy. It shall study the target market (not restricted in an exclusive manner to MotoStudent Race), and the cuota that is aimed for, the target selling price, identification of clients and users, commercialization channels; with the objective of dimension the production. The market competition in this exercise are: 8 manufacturers. The MotoStudent Race would be call in 8 countries to be selected by the team.
- D.3. Legal constains (registry, subsidies...)
- D.4. Location
- D.5. Value chain and SWOT
- D.6. Make of Buy decisions. Which components or processes would be purchased and which manufactured. To define the supply chain.
- D.7. Manufacturing process: Detailed explanation of the manufacturing of each component, as well as the complete assembly of the motorcycle, with the used materials, tools and means.
- D.8. Flow analysis of the manufacturing process: Study of the different processes and their succession along the productive chain. Layouts of the production plant.
- D.9. Quality plan. Controls in Reception, process and final product
- D.10. Storing, logistics and packaging.
- D.11. Human resources: Workforce, positions, roles within the company...

## **F.2.6 Chapter E: Business Plan**

Chapter E (Business Plan) shall contain a financial report with for the fictitious scenario of the serial production motorcycle, with the estimations of costs, benefits and amortization.

F.2.6.1 For the cost calculation of the mass production motorcycle, the Organisation set the price of certain components and materials. Those costs are reflected in the table of Art. H.1.2.

F.2.6.2 For the calculation of the real costs of the prototype motorcycles (Development costs), the prices shown must be real prices, regardless of whether they match the prices published by the Organization for the serial production motorbike. This cost shall be paid back within the period of sales of current model.

F.2.6.3 The manufacturing costs established for the serial production motorcycle shall match those given in Art. F.2.5.1

F.2.6.4 Chapter E (Business Plan) must include at least the following compulsory sections:

E.1. Real realization costs of the prototype motorcycle (Development costs): Breakdown of the costs of the different components, materials, external services. It shall not include the students labor calculation.

E.2. Costs of the mass production motorcycle: Calculation of the manufacturing costs of each mass production motorcycle for the company, taking into account the development costs, the manufacturing cost and the fixed costs given in H.1.2. Break even calculation.

E.3. Budget, investment and funding.

E.4. Financial ratios. VAN and IRR.

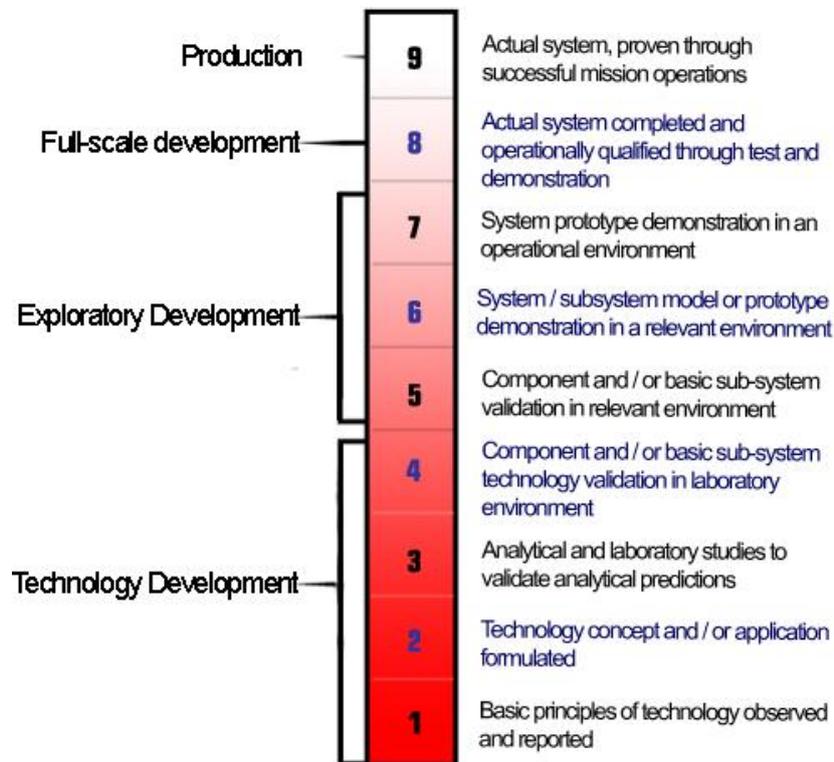
E.5. Conclusions.

## **F.2.7 Chapter F: Technological Innovation Project.**

As an additional requirement, the project must include an innovation that provides a novelty in the motorcycle design. It can be a solution taken from other field of application, or any new idea for the current state of the art, compared with the solutions commonly used in this field. This innovation shall be implemented in the prototype, and developed in Chapter F fo MS1 Project

- F.2.7.1 All the prototype motorbikes have to feature this innovative solution. The use of this innovation in the Industrialization project is not compulsory due to cost reasons.
- F.2.7.2 The initial level of Technology Readiness can be measured in different scales. The following will be used, that allows a measurement of the maturity degree of a technology.

### R&D - Technology Readiness Mapping



All the developments will finally achieve the level 7, as they will be implemented in the real prototype in real use conditions. But the starting level shall be analyzed, and the development effort (costs and time), dedicated to each case

- F.2.7.3 This innovation included in the prototype has to comply with the rules established in the Technical Regulations, specifically anything related with safety requirements.

F.2.7.4 The Chapter Technological Innovation Project of the Project must include the following minimum sections:

- F.1. Starting point: Explanation of where the idea to develop this innovation and the need to implement it came from.
- F.2. State of the Art and infringement risks
- F.3. Development effort
- F.4. Objectives.
- F.5. Feasibility of its implementation in the market: Study of the possibility to launch it into the market of race motorcycles, street motorcycles or implementation in other motorcycling disciplines.
- F.6. Plans and simulations.
- F.7. Conclusions.

### **ARTICLE 3: DEADLINES AND SUBMISSION OF THE PROJECT**

#### **F.3.1 Deadlines calendar**

According to the Competition Calendar, defined in Art.A.6.1 of these Regulations, each part of the MS1 Project shall be submitted at the established milestones.

F.3.1.1 These parts shall be definitive, and will contribute to the final score

F.3.1.2 The established milestones correspond to the delivery of the different chapters that integrate the structure of the MS1 Project, and should be sent to the Organization within the deadlines reflected in the Calendar of Art.A.6.1.

#### **F.3.2 Submission method**

F.3.2.1 Each part of the MS1 Project must be submitted in Digital Format within the established deadlines.

- F.3.2.2 Each chapter of the MS1 Project may have a free number of pages, provided that the total final number of the complete MS1 Project does not exceed 200 pages. (Including any type of annex, cover, index, etc.). It is recommended to dedicate 60% of the total project cost to parts A, B, C and F; And 40% to parts D and E.
- F.3.2.3 The pages of each part must be numbered, including subscripts, sub-pages or annexes of each part. The numbering format should reflect the part to which each page corresponds, ie: A1, A2, A3 ..., B1, B2, B3 .... For the main cover and general index it will not be necessary to reflect this numbering, but the total limitation of 200 pages should be taken into account.
- F.3.2.4 Together with the project in PDF-format, the teams may submit the CAD-files, videos and simulations they may seem fit. Any document or drawing in PDF format, images or other aspects that may be contained within the parts of the Project shall not be accepted as an attachment.
- F.3.2.5 It is recommended to use Arial font, minimum font-size 10px.
- F.3.2.6 At the time of Registration of the team in the Final Event, a copy of the complete MS1 Project (All chapters) must be submitted to the Organization.

### **F.3.3 Changes or modifications after delivery**

- F.3.3.1 It will be possible to make small modifications after delivery of projects (never structural changes), to do so, it shall be completed an addendum with sufficiently justified reasons for the changes.
- F.3.3.2 The jury may discard these changes if not considered sufficiently justified and not to take them into account in its assessments
- F.3.3.3 On the Competition Calendar is specified the deadline for making small changes in the project, from the same, all addenda received will be omitted directly.

## **ARTICLE 4: PRESENTATION IN FRONT OF THE JURY**

For the Evaluation of the MS1 Phase, during the Final Event there will be two presentations in front of a jury:

- Presentation “Design and Innovation”
- Presentation “Bussiness”

### **F.4.1 Presentation “Design and Innovation”**

The first presentation called “Design and Innovation” shall reflect the following parts of the project:

A.- Conceptual Design and Targets

B- Detailed Design

C.- Prototyping and Validation

F.- Technological Innovation Project

### **F.4.2 Presentation “Bussiness”**

The second presentation called “Bussiness” shall reflect the following parts of the project:

D.- Industrial Production

E.- Business Plan

### **F.4.3 Presentation method**

The juries will have had the projects in advance, and will be provided with a template where they will have given value to all the features of the project previously to the presentation.

- F.4.3.1 The presentation “Design and Innovation” will be with the bike in front of the jury expert in the areas of design, innovation, automotive and competition; and should be focused on the justification of all the features that the bike has, and solving doubts and questions that each jury will have brought with them.
- F.4.3.2 The presentation “Business” will run independently in a separate room, in front of an expert jury in the areas of industrialization and business. The exposition format will be as a presentation of the developed business plan to an investors group interested in financing the 49% of the project.
- F.4.3.3 No confidentiality restrictions from the teams are allowed. If a team does not want to show their content for any reason, the scoring of the corresponding chapter of the Project will be zero.
- F.4.3.4 The teams shall nominate one or two different students for the exposition of each presentation (“Design and Innovation” and “Business”), i.e. the same students are not allowed to make both presentations. Each presentation shall be made by a maximum of 2 students, while the rest of the team may stay in attendance. No external public is allowed.
- F.4.3.5 Each presentation will have a maximum duration of 20 minutes + 5 minutes for questions by the jury. After 20 minutes of exposure, the jury will stop it regardless of the point where it is, not being able to value it fully in the case of not finishing. If the jury deems appropriate, may direct questions to specific listeners who are in the room to assess the degree of team involvement in all phases.
- F.4.3.6 The presenting students may use a digital presentation as a support. The Organisation will provide for a projector and a screen.
- F.4.3.7 Students must bring their own laptop for the presentation.
- F.4.3.8 The teams may bring their digital presentation on an extractable hard disc or CD-ROM.
- F.4.3.9 The digital presentation may include images and videos.
- F.4.3.10 During the presentation it will be allowed to show pieces or elements which the students consider as adequate for the explanation, as well as using other means of dissemination as the digital presentation (leaflets drawings, etc.).
- F.4.3.11 It is recommended to condense the project presentation and cover the most important parts which will be evaluated by the jury and that will be published for the participating teams. Teachers and tutors of each project only may attend as listeners, being explicitly prohibited their participation at any point of the exposure and of question time.

#### F.4.4 Assessment

F.4.4.1 The evaluation of the MS1 Phase will be carried out by a Jury formed made up of experts from the industrial sector, experts in innovation, automotive and MotorSports.

F.4.4.2 For the assessment of MS1 Phase, the jury will be based on both the presentations and the projects delivered.

F.4.4.3 Teams must follow the order and the schedule of the presentation. If not, they will get a minor fault which will have an influence on the final score.

### ARTICLE 5: ASSESSMENTS

#### F.5.1 Scoring

The MS1 phase will be assessed based on a total of 500 achievable points, distributed as follows:

PRESENTATION	CHAPTERS OF THE PROJECT	SCORING	AWARDS	
Design and Innovation	A. Conceptual Design	75	Best Design Project	Best Industrial Project MS1
	B. Detailed Design	75		
	C. Prototyping and Validation	50		
	F. Technolgical Innovation	100	Best Technological Innovation	
Bussiness	D. Industrial Production	125		
	E. Business Plan	75		
	<b>TOTAL</b>	<b>500</b>		

F.5.1.1 Although the way in which the presentation is carried out will have an effect on the assessment, the largest part of the score will depend on the content of the project.

F.5.1.2 The assessment by the jury will be final.

## F.5.2 Awards

The awards for the MS1 Phase will be:

- Award to the Best Industrial Project MS1 (All phases)
- Two second prizes to:
  - Best Design Project
  - Best Technological Innovation

F.5.2.1 The prize for the Best Industrial Project MS1 will be awarded to the team that achieves the best overall score of the MS1 phase.

F.5.2.2 The second prize for the Best Design Project will be awarded to the team achieving the best score after adding the results of chapter A, B and C. (A: Conceptual Design, B: Detailed Design, C: Prototyping and Validation)

F.5.2.3 The second prize for the Best technological innovation will be awarded to the team achieving the best score in Chapter F (F: Best Technological Innovation)

F.5.2.4 The Organization reserves the right to add new awards throughout the development of the Competition.

## **V International Competition MotoStudent**

### **SECTION G: MS2 REGULATIONS**

## ARTICLE 1: OBJECTIVES AND CONDITIONS

The MS2 phase consists of a series of tests aimed at assessing the dynamic behaviour and the performance of the manufactured motorcycles, as well as the skills of the teams in terms of mechanics and organisation.

### G.1.1 Requirements

To take part in MS2 Phase, the Organization imposes a series of requirements indicated below.

G.1.1.1 The participating teams must pass a minimum of 40% of the score of Phase MS1, to score in MS2 Phase.

G.1.1.2 The prototypes must have passed the Scrutineering to participate in the MS2 Phase, and must be presented in suitable conditions to take part in the dynamic tests. The Technical Staff of the Organization can check the conditions of the prototypes at all times.

### G.1.2 MS2 Sports Committee

The MS2 Phase will be controlled and managed by the MS2 Sports Committee, which will be formed, at least, by the following official positions:

- Competition General Manager
- Competition Sport Director
- Race Director
- Race Director Assistant
- Sporting Jury (Officials coordinators)
- Timekeeping Director
- Competition Technical Director
- Chief Scrutineer

## **ARTICLE 2: GENERAL REGULATIONS DURING THE FINAL EVENT**

### **G.2.1 Identification**

On their arrival at the Event, the Organisation will provide identification wristbands to team members, riders and tutors. These wristbands will serve the Organisation as identification for the follow-up during the tests and interventions of the motorcycle.

G.2.1.1 Team members must wear the identification wristbands when accessing the Event site and keep them throughout the Event.

G.2.1.2 The access to the Pit Lane will be restricted to persons wearing a wristband, i.e. to persons who have entered the Competition. The access to all the other areas (Paddock, cafeteria, area of the pit garages, etc.) is free for general public.

### **G.2.2 Facilities**

All participating teams commit themselves to look after the facilities in which the Event is going to take place. If not, the Organisation shall have the right to impose sanctions or to exclude the offender from the event.

G.2.2.1 The Organisation will prepare and allocate, free of charge, an area or box to each team. The box will be the compulsory place to carry our repairs and set-ups on the motorcycle. Each box will be shared by two teams. The box will be divided into area A and area B. The teams will thus have each an approximately area of 70 m<sup>2</sup>.

G.2.2.2 Boxes are equipped with 220V European standard 220 power sockets or industrial 220V sockets and 380V three-phase sockets. They are also fitted with TV outlets to watch the live times, compressed air and water sockets and a toilet.

G.2.2.3 The personal and transport vehicles must be parked in the respective dedicated areas. Only vehicles of the Organisation are allowed to drive on the track and the test areas.

G.2.2.4 The Organization will determine the parking, exhibition and activities areas, which will be communicated to the teams prior to the Event. In Art.H.3 is attached an estimated plan of the distribution during the Event.

### **G.2.3 Movement and repairs of the motorbike**

For reasons of safety, the start and movement of the motorcycle must follow the rules stated below. Not complying with these rules may entail a penalty or even the exclusion from the Competition.

G.2.3.1 The motorcycle cannot be started by propelling the lifted driving wheel with the hand.

G.2.3.2 During the scheduled tests, the motorcycle shall only move by its own means. For the rest of the movements around the paddock, it must be pushed or moved with the engine turned off.

G.2.3.3 Repairs and manipulations on the motorcycle during the stay in the Circuit can only be carried out inside the box of each team. It is strictly forbidden to move the motorcycle to any vehicle or assistance hospitality to perform manipulations on it.

### **G.2.4 Spare parts shop**

During the Event, the Organisation will set up a shop for the teams to buy spare parts of the original kit provided by the Organisation. The shop will also offer tyres both for dry and wet weather conditions. The Organization will provide for a tyre cutting and balancing service.

G.2.4.1 The payments at the shop during the Event may be made in cash (€) or with a credit card. The accepted credit cards are:



## **G.2.5 Contact with Organization during the Final Event**

The contact between teams and Organization during the Final Event should be done as a priority through the Teams Attention Office installed in the Paddock of the Racing Circuit.

G.2.5.1 The telephone number to contact the Organisation during the Final Event will be +34 978 877 935.

G.2.5.2 During the Event any Tutor, Team Leader or rider can be summoned by the Organization for the communication of incidents. Teams have the obligation to attend these appointments in the indicated place in a maximum period of 15 minutes from the corresponding notice.

## **G.2.6 Briefings**

During the Event, the Organization will conduct several briefings to explain the development of the Competition to teams, tutors and riders.

G.2.6.1 Team Leaders, faculty advisors or riders are obliged to attend the briefings to which they are called by the Organization. Failure to attend these briefings will be penalized without justifiable cause.

## **G.2.7 Communication with the rider**

Radio communication between the team and the rider during the tests or the race is forbidden.

G.2.7.1 The communication between the team and the rider is only allowed by means of a board shown on the pit wall and only during the practise sessions and the race.

G.2.7.2 The information board must be light, with a maximum size of 1m in width and 1.5m in height.

G.2.7.3 The information board must be shown by only one team member, who must hold the board firmly in order to avoid the board from crashing onto the track.

G.2.7.4 The information board only can be shown when the rider pass the Finish Sraight.

## **G.2.8 Times and results communication**

The Organization will communicate test times and results through different ways.

G.2.8.1 The Organization will publish on the bulletin board enabled in the paddock the results obtained in each of the MS2 tests, after the completion of each one.

G.2.8.2 The timing results of free practices, timed practices and race will be broadcast live by the Circuit internal TV signal. In addition to being screened in common installations, all boxes and Pit wall will have TV shots in order to access the times emission.

G.2.8.3 The timing results of free practices, timed practices and race will be broadcast live through the internet. The Organization will communicate the web platform to which it can access for the monitoring of live times.

G.2.8.4 The final results obtained in each test will be published on the Internet. At the end of the Event, the Organization will send the results by email to the teams contact addresses.

## **G.2.9 Official Schedule during the Final Event**

The Organization will establish a series of schedules in which will cite the teams to carry out the tests and events corresponding to the phases of scrutineering, MS1 Phase and MS2 Phase. These schedules will be published and sent to the teams prior to the Event.

G.2.9.1 Failure to comply with the schedules marked by the Organization for the Final Event will mean the team penalty in the corresponding test/phase, or even the exclusion of that test if, for operational reasons, this will be considered for justified reasons.

## ARTICLE 3: SPORT BEHAVIOUR

### G.3.1 Weather conditions

La Organización se reserva el derecho a modificar los horarios e incluso los métodos de valoración por causa de imprevistos meteorológicos.

G.3.1.1 In case of rain the Organisation may establish three different rain levels:

- Light
- Moderate
- Intense

G.3.1.2 If the Organisation establishes that there is "light" rain:

For both MotoStudent Petrol and MotoStudent Electric it will be possible to carry out the MS2 tests, but it may become advisable to use wet weather tires.

G.3.1.3 If the Organisation establishes that there is "moderate" rain:

For both MotoStudent Petrol and MotoStudent Electric Categories it will be possible to carry out the MS2 tests, but will be compulsory to use wet weather tires.

G.3.1.4 If the Organisation establishes that there is "intense" rain, it won't be possible to carry out the outdoor tests for any category and all motorcycles that are outside their respective pit garages must return to their garages immediately.

G.3.1.5 In case of "intense" rain, the Organisation will decide and notify the participants if a test is cancelled or postponed.

G.3.1.6 For any other situation or unforeseen weather, the MS2 Sport Committee will decide and announce if there is any postponement or cancellation.

### G.3.2 Access to the track

The Access to the track must be done by the exits situated at the end of the Pit Lane

### **G.3.3 Behaviour on the track:**

- G.3.3.1 Any maneuver of a rider in the opposite direction of the race is strictly forbidden
- G.3.3.2 In the event of an accident or breakdown, the riders must immediately take their motorcycle out of the track, where it could not be a hazard for others and out of the racing line.
- G.3.3.3 At the track it is prohibited that any person other riders, Race Director and deputies, Jury Members, Scrutineers or Track Marshal take a bike from the track.
- G.3.3.4 The Race Director may stop a motorbike whose rider had committed an infraction. A black flag with the bike number would be shown to a rider to stop immediately in all marshal posts. If the rider does not stop after two laps, the Race Director will communicate the Team Manager to give the order of stop to the rider. The reasons of this decision will be communicated to the Team Leader.
- G.3.3.5 The Race Director or any marshal post may communicate a rider to leave the track if the motorbike status may put him/herself or others in danger. A black flag with an orange disk and the bike number would be shown to a rider in all marshal posts to stop immediately, without completing the lap.

### **G.3.4 Behaviour at the Pit Lane**

- G.3.4.1 The speed limit throughout the pit lane is set up to 60kmph
- G.3.4.2 Only people with the proper accreditation may be in the pit lane during the competition. No person under 16 years old is allowed in the Pit Lane. The Organization, by itself or by a request of a Team Leader, may clear the pit lane from people who are not allowed.
- G.3.4.3 In case of oil or any other liquid spillage from a motorbike in the Pit Lane soil, it will not be allowed to start that motorbike up before the area and it are completely cleaned.
- G.3.4.4 To start the engine up and get to the track, in case the automatic start device of the engine does not work, two people may help the rider pushing the motorbike up to the pit lane exit. Additional batteries are not allowed to start the motorbike.

G.3.4.5 If a rider going out from his/her box, has a problem in the motorbike at the slow lane, can return to the box with the engine off, through the work zone and with the protection of a boxes official.

### **G.3.5 Behaviour at Boxes**

G.3.5.1 The engine/motor must be off whilst stopping in the box. It would be allowed to start it up for temporary checks or set up.

G.3.5.2 During Pit stops only can manipulate the motorbike the registered students. Failure to comply with this rule may result in the exclusion of the team in the corresponding test

G.3.5.3 During Pit stops a maximum of 3 people (included the rider) may manipulate the motorbike. Any contact with the motorcycle will be considered as manipulation (even if the rider stays on it, although he/she does not intervene).

G.3.5.4 Inside the box there is no limit of members manipulating the motorbike.

G.3.5.5 Oil exchange and cleaning must be done over a recipient and inside the box. After this operation the team must ensure that the area remains perfectly clean.

G.3.5.6 It is forbidden to smoke, set fire, or using devices that may spark either in the Pit Lane and boxes.

### **G.3.6 Signals with flags**

The following flag code will be used to alert the riders during the course of the MS2 dynamic tests:

- Red flag: Interruption of the session.
- Black flag: Immediate stop of the rider to whom the black flag was shown together with a number board indicating his/her starting number. The rider will not be allowed to get back to the track.
- Black flag with orange disk: Immediate stop of the rider whose number has been indicated with the flag. It means a Technical problem. The rider may get back provided the technical problem is solved.
- Yellow flag: A hazard onto track. Forbidden to overtake.
  - 1 flag: The hazard is out of the track
  - 2 flags: The hazard is fully or partly blocking the track
- Yellow and red striped flag: The adhesion of that section of the track may be affected by any reason other than rain.
- White flag with a diagonal red cross: Drops of rain in that section of the track
- Green Flag: Track is clear. End of the overtaking prohibition.
- Blue Flag: Shown to a slow rider who is going to be overtaken by a fastest one. The slow rider must give way to the faster ones.

G.3.6.1 Any infraction or ignorance of the signals, may be penalised.

### **G.3.7 Regulations priority order**

Any situation or infraction not contemplated in the MotoStudent Regulations, will be ruled by the RFME Sporting Regulations of Campeonato de España de Velocidad 2018.

## ARTICLE 4: DYNAMIC TESTS

### G.4.1 Objectives and procedure

The dynamic tests consist of a series of exercises prepared to show and assess the behaviour and performance of the motorcycles.

G.4.1.1 MS2 dynamic tests described in this section correspond to the two categories of the Competition: "MotoStudent Petrol" and "MotoStudent Electric". Each Category will have its own separate score.

G.4.1.2 The dynamic tests on the track will be carried out by the rider presented by the team.

G.4.1.3 The dimensions, speed, schedules, and measurement indicated in this article may vary and change in the Event, if the Organization so had to determine for any reason.

G.4.1.4 The dynamic tests referred below as Test 1, Test 2 and Test 3 will be performed twice, taking the best score of the two as the valid for the team.

### G.4.2 Prueba 1: Brake test

The brake test will consist in an assessment of the distance needed to bring the motorcycle to a complete halt from a minimum speed of 80 km/h.

G.4.2.1 The start will be given by lowering a flag or similar signal by a sport marshal at the starting point.

G.4.2.2 The rider will have a maximum time of 10 sec from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.2.3 The test will be carried out on a straight with a total length of 350m.

G.4.2.4 The maximum track length available for the motorcycle to reach a speed equal or higher than 80 km/h is 200m. The Organisation will fit the specific point with a speed measurement device to verify that the speed has been reached.

- G.4.2.5 After passing the end mark of the acceleration straight (speed trap point), the rider will have to try to bring the motorcycle to stop in the shortest possible distance.
- G.4.2.6 The marshals will measure the point of the vertical tangent of the front tyre (foremost part of the motorcycle).
- G.4.2.7 The distance between the point described in Art. G.4.2.6 and the braking start line will be considered as the braking distance for the assessment of the test result.
- G.4.2.8 The score of the braking test will be awarded after recording the braking distance of all teams.
- G.4.2.9 The assessment of the test will be made by means of an extrapolation with the achieved results.

$$\frac{M_F - D}{M_F - P_F} = \frac{60 - P}{59}$$

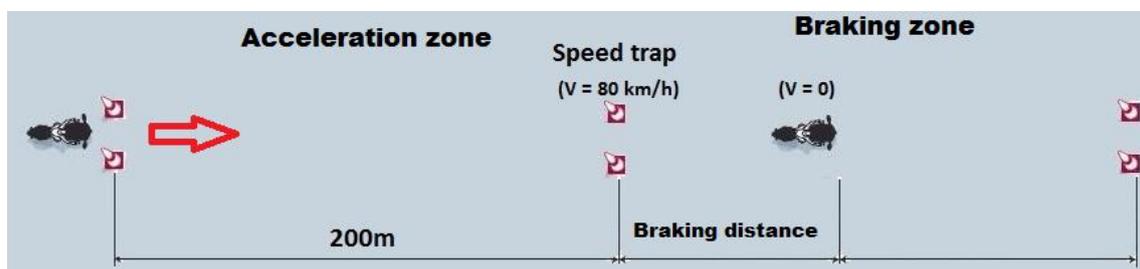
Where:

- $M_F$  : The most efficient braking distance.
- $P_F$  : The less efficient braking distance.
- D: Distancie of the braking to evaluate.
- P: Score of the braking to evaluate.

G.4.2.10 The figure resulting from article G.4.2.9 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded number and may range from one point for the less efficient braking to 60 points for the best braking.

G.4.2.11 It will not be considered as valid those results that exceed 185% of the value of more efficient braking, receiving in this case 1 point score for this test.

G.4.2.12 Graphic description of the test.



Graphic description of Test 1: Brake Test

G.4.2.13 If the speed at the speed trap is lower than 80 km/h, the following penalties will be applied, which shall be added to the achieved braking distance.

<u>Speed (km/h)</u>	<u>Penalty</u>
79	+ 2 m
78	+ 3 m
77	+ 4 m
76	+ 5 m
75	+ 6 m
70-74	+ 10 m
<70	Null result

### G.4.3 Test 2: Gymkhana

The second test will be a little timed gymkhana

G.4.3.1 The start will be given by lowering a flag or similar signal by a sport marshal at the starting point.

G.4.3.2 The rider will have a maximum time of 10 sec from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.3.3 The time needed to cover the complete route will be recorded by means of cells at the start and finish points.

G.4.3.4 The table below shows the penalties for failures. They are time penalties that will be added to the total time of the test.

<u>Failure</u>	<u>Penalty</u>
Move or pull a cone	+ 5 seconds
Not exceed a cone for the right place	+ 10 seconds

G.4.3.5 The scores for the test will be awarded according to the times registered by all of the teams and with the following extrapolation.

$$\frac{M_T - T}{M_T - P_T} = \frac{100 - P}{99}$$

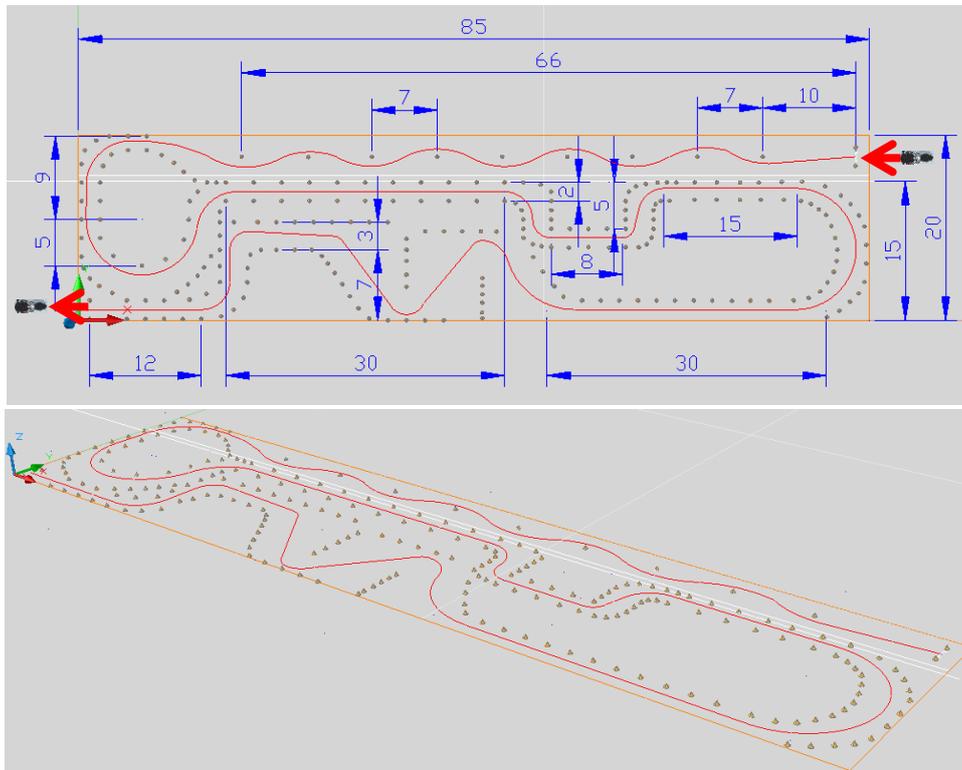
Where:

- $M_T$  : Best time.
- $P_T$  : Slowest time.
- T: Time to evaluate.
- P: Score of the time to evaluate.

G.4.3.6 The figure resulting from article G.4.3.5 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded number and may range from one point for the slowest time to 100 points for the quickest time.

G.4.3.7 It will not be considered as valid those results that exceed 170% of the value of the fastest time, receiving in this case 1 point score for this test.

G.4.3.8 Graphic description of the test:



**Graphic description of Test 2: Gymkhana / \* Measures indicated in meters (m)**

G.4.3.9 Dimensions and geometries reflected in the images in Art. G.4.3.8 are orientative, so they may suffer slight variations in the approach of the test during the Final Event.

**G.4.4 Test 3: Best acceleration**

During this test, the maximum acceleration of each motorcycle from a complete stop on a 150m-long straight will be measured.

G.4.4.1 The start will be given by lowering a flag or similar signal by a sport marshal at the starting point.

G.4.4.2 The rider will have a maximum time of 10 sec from the marshal signal to start the test. In case of not starting in this time the rider will be excluded from the test.

G.4.4.3 The rider must try to cover the 150m of the track in the least possible time (maximum acceleration).

G.4.4.4 The time needed to cover the complete route will be recorded by means of cells at the start and finish points.

G.4.4.5 Once the times of all motorbikes have been recorded, the figures will be extrapolated:

$$\frac{M_T - T}{M_T - P_T} = \frac{60 - P}{59}$$

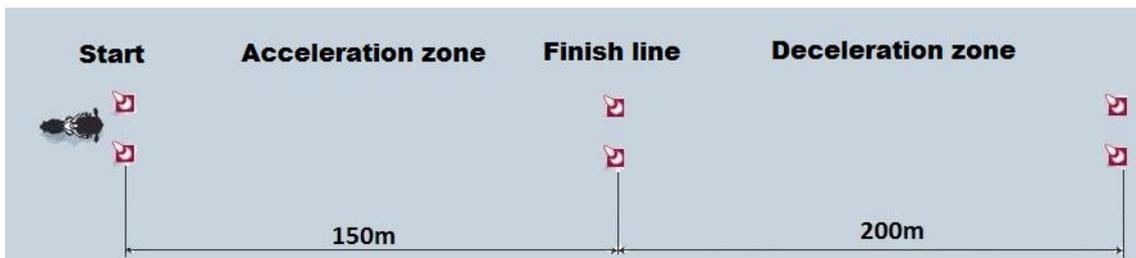
Where:

- $M_T$  : Fastest time.
- $P_T$  : Slowest time.
- T: Time to evaluate.
- P: Score of the time to evaluate.

G.4.4.6 The figure resulting from article G.4.4.5 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded-up number and may range from one point for the slowest acceleration to 60 points for the fastest acceleration.

G.4.4.7 It will not be considered as valid those results that exceed 140% of the value of the fastest acceleration time, receiving in this case 1 point score for this test.

G.4.4.8 Graphic description of the test.

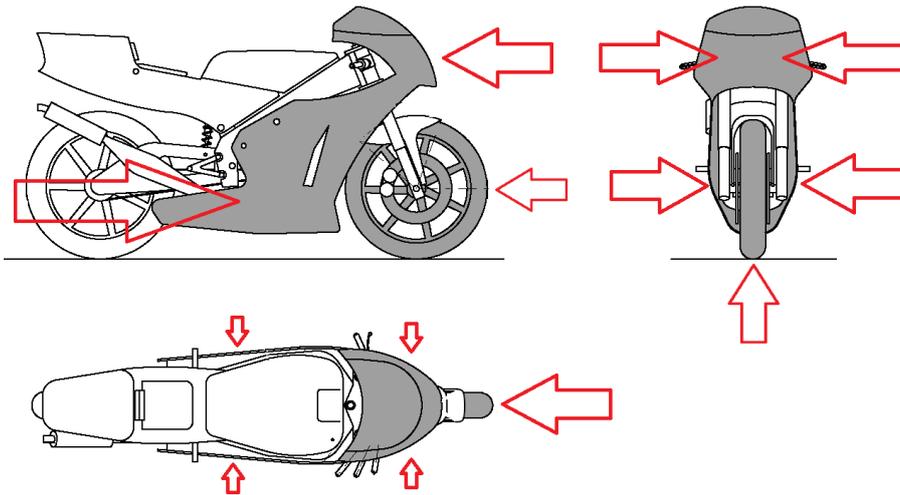


Graphic description of Test 3: Best Acceleration

#### G.4.5 Test 4: Mechanical test for teams

This test is about assessing how quick the team works in the pit garage, and whether or not this aspect has been taken into account in the design of the motorcycle.

G.4.5.1 The test will consist in completely dismantling and assembling front fairing (screen-front-sides-lower fairing) and the front wheel set. Guidance figure:



G.4.5.2 The dismantling time will be recorded by a marshal, who will also check that the process is carried out completely.

G.4.5.3 At the beginning and at the end of the test, the motorcycle must be on stands over the box floor, assembled exactly how it has been conceived to ride on the track. This aspect will be checked exhaustively by the marshals.

G.4.5.4 Only two team members will be allowed to take part in this test. The remaining team members may stay in the pit garage as spectators, but without interfering in the activities of their colleagues.

G.4.5.5 The use of any kind of tools and systems is free.

G.4.5.6 The pieces will be considered as dismantled when the marshal controlling the test clearly sees that there is no contact element between the motorcycle and the pieces. The dismantled parts should be supported on the ground.

G.4.5.7 When tightening the wheel assembly, it will not be necessary to adjust to the optimum torque. The marshals shall only verify that the components have been firmly fixed.

G.4.5.8 The following extrapolation will be made after recording the times of all teams:

$$\frac{M_T - T}{M_T - P_T} = \frac{30 - P}{29}$$

Where:

- $M_T$  : Fastest time.
- $P_T$  : Slowest time.
- T: Time to evaluate.
- P: Score of the time to evaluate.

G.4.5.9 The figure resulting from article G.4.5.8 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded number and may range from one point for the slowest time to 30 points for the quickest time.

G.4.5.10 It will not be considered as valid those results that exceed 900% of the value of the best time, receiving in this case 1 point score for this test.

## ARTICLE 5: PRACTICE SESSIONS

Training sessions will be held in the FIM Grand Prix International layout of Motorland Aragón, with a length of 5.077,65m. Such tracing is represented in Article 2 of Section H of these Regulations.

### G.5.1 Free practices

The teams will have 2 rounds of 40-minute free practise sessions on the racetrack, named "Free Practice 1" and "Free Practice 2". Two courses for the Category "MotoStudent Petrol" and other two for the Category "MotoStudent Electric" will take place independently.

G.5.1.1 After these 40 minutes a chequered flag will be shown at the finish line and no motorcycle will be allowed to access the track. The motorcycles that are on the track and take the chequered flag must leave the track after the following lap.

## **G.5.2 Timed practices**

Teams will have a 40-minute timed practice session on the FIM Grand Prix International layout (See Article 2 of section H)". A course for the Category "MotoStudent Petrol" and other one for the Category "MotoStudent Electric" will take place independently.

G.5.2.1 The lap times clocked by the motorcycles during these practises will be recorded by the Organisation.

G.5.2.2 After these 40 minutes a chequered flag will be shown at the finish line and no motorcycle will be allowed to access the track. The motorcycles that are on the track and take the chequered flag must leave the track after the following lap.

G.5.2.3 If a motorcycle is making a timed lap at the end of the 40-minute session the rider may complete the lap and the time clocked will be considered as valid.

G.5.2.4 The lap times of the timed practise will be broadcasted live through the TV signal of the Circuit.

## **ARTICLE 6: SCORING TESTS DURING THE PRACTICES**

### **G.6.1 Test 5: Maximum speed at Speed trap**

This test consists in achieving the maximum speed at a specific point of the racetrack.

G.6.1.1 The Organization will place a speed measurement device at the point known as Speed Trap.

G.6.1.2 The speed recordings for this test will be made during the “Free practice 2” session.

G.6.1.3 Once the 40-minute free practise session has finished no further time recording will be made at the speed trap, and the best of the recorded speeds will be used to score the test performance.

G.6.1.4 The scoring of the maximum speed test at speed trap will be carried out after recording the top speeds of all teams.

G.6.1.5 The following extrapolation will be made with the recorded speeds:

$$\frac{V_{MAX} - V}{V_{MAX} - V_{MIN}} = \frac{30 - P}{29}$$

Where:

- $V_{MAX}$  : Max. Speed.
- $V_{MIN}$  : Minimum speed.
- V: Speed to evaluate.
- P: Score.

G.6.1.6 The figure resulting from article G.6.1.5 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded number and may range from one point for the slowest speed to 30 points for the fastest.

G.6.1.7 It will not be considered as valid those results below than 80% of the value of the best Vmax, receiving in this case 1 point score for this test.

## **G.6.2 Test 6: Pole position**

This test consists in clocking the fastest lap time on the racetrack.

G.6.2.1 The times for this test will be recorded during the timed practice session.

G.6.2.2 The following extrapolation will be made after recording the times of all teams:

$$\frac{M_T - T}{M_T - P_T} = \frac{40 - P}{39}$$

Where:

- $M_T$ : Fastest time.
- $P_T$ : Slowest time.
- T: Time to evaluate.
- P: Score.

G.6.2.3 The figure resulting from article G.6.2.2 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded-up number and may range from one point for the slowest time to 40 points for the quickest time.

G.6.2.4 It will not be considered as valid those results that exceed 125% of the value of the best time, receiving in this case 1 point score for this test.

## ARTICLE 7: RACE

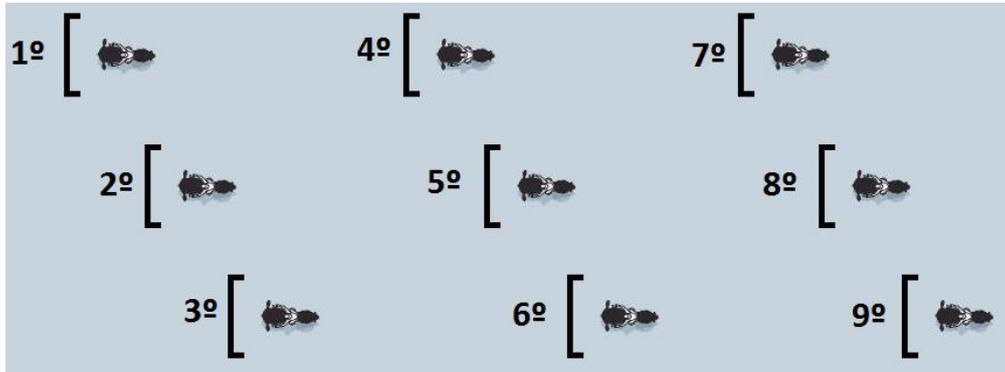
It will run independently:

- The final race of the Category "MotoStudent Petrol".
- The final race of the Category "MotoStudent Electric".

Both races will take place on FIM Grand Prix International Layout of Motorland Aragón, with a length of 5.077,65m. Such tracing is represented in Article 2 of Section H of this Regulation.

### G.7.1 Starting grid

The starting grid will have a formation of 3 motorcycles per line, and all spaces from the starting line to the back will be completed.



G.7.1.1 The starting order will be established according to the fastest times clocked by each motorcycle during the timed practice session.

### G.7.2 Development of the race

G.7.2.1 The starting order will be established according to the fastest times clocked by each motorcycle during the timed practice session.

G.7.2.2 The motorcycles will be ridden by the riders nominated by the teams and approved by the Organisation as established in Art.A.3.6 of these Regulations.

G.7.2.3 After the race, the motorcycles can be scrutineered by the Organisation in order to check weights and other technical aspects.

G.7.2.4 The race of the Category "MotoStudent Petrol" will be held for 8 laps (approximate distance of 40.6 Km).

G.7.2.5 The race procedure for the Category "MotoStudent Petrol" will be configured as follows:

- Formation lap from pit lane to starting grid.
- Countdown on the grid.
- Warm up lap to stop again on the starting grid.
- Race (8 laps) with start from static.
- Victory lap and return to parc ferme.

G.7.2.6 The race of the Category "MotoStudent Electric" will be held for 5 laps (approximate distance of 25.38 Km).

G.7.2.7 The race procedure for the Category "MotoStudent Electric" will be configured as follows:

- Direct access from pit lane to starting grid (without formation lap).
- Countdown on the grid.
- Warm up lap to stop again on the starting grid.
- Race (5 laps) with start from static.
- Victory lap and return to parc ferme by "national" layout (2,379.12m).

G.7.2.8 The maximum time set for the warm-up lap will be 4 '30 " from the start command. After this time all the bikes that are not placed in the corresponding position of the starting grid should leave the track immediately, being able to be picked by the assistance services to take the exit from Pit Lane later.

G.7.2.9 After the race sessions, all motorbikes must remain in Parc Ferme during the time that the Organization deems appropriate to carry out the appropriate checks.

### G.7.3 Race scores

G.7.3.1 Teams will receive scores after the final classification of the race, based on the following criteria:

Position	Score	Position	Score
1st	150	17th	30
2nd	130	18th	25
3th	112	19th	20
4th	100	20th	18
5th	90	21th	16
6th	85	22th	14
7th	80	23th	12
8th	75	24th	10
9th	70	25th	9
10th	65	26th	8
11th	60	27th	7
12th	55	28th	6
13th	50	29th	5
14th	45	30th	4
15th	40	31th	3
16th	35	...	3

G.7.3.2 In order to receive the score assigned in Art. G.7.3.1, at least 75% of the development of the race must have been completed (considering whole laps). If a team does not complete 75% of the race, the score will be assigned based on the following formula:

$$P = \text{Pos} \times \% \text{race}$$

Where:

- P: Definitive score
- Pos: Assigned score by race position
- %race: Percentage of race completed (based on the number of laps completed)

#### **G.7.4 Test 7: Fastest lap during the race**

The fastest lap during the race will be scored.

G.7.4.1 The Organization will record the lap times of all motorcycles during the whole race.

G.7.4.2 Once the race has finished, the fastest laps recorded during the race will be scored according to the following extrapolation:

$$\frac{M_T - T}{M_T - P_T} = \frac{30 - P}{29}$$

Where:

- $M_T$ : Fastest time.
- $P_T$ : Slowest time.
- T: Time to evaluate.
- P: Score of the time to evaluate.

G.7.4.3 The figure resulting from article G.7.4.2 will be rounded to the corresponding integer. The score of the test will be awarded based on this rounded number and may range from one point for the slowest time to 30 points for the quickest time.

G.7.4.4 It will not be considered as valid those results that exceed 115% of the value of the best time, receiving in this case 1 point score for this test.

## ARTICLE 8: RESULTS

### G.8.1 Scores

The assessment of the MS2 tests, with the highest possible scores is shown in the following table.

<u>Class</u>	<u>Session</u>	<u>Test</u>	<u>Scoring</u>
Dynamic tests	Track tests	1.- Brake test	60
		2.- Gymkhana	100
		3.- Best acceleration	60
	Box test	4.- Mechanical test	30
Race	Free practices	5.- Maximun speed at ST	30
	Timed practices	6.- Pole position	40
	Race	7.- Fastest lap during race	30
		8.- Race position	150
Total			500

G.8.1.1 If for reasons outside the Organization like adverse conditions and other possible reasons, it should cancel one or more of the Scoring Tests, the MS2 Sports Committee reserves the right to change the assignment of scores, with previous notification to the participating teams.

### G.8.2 Awards

The top three teams of the MS2 phase will be awarded with the following awards:

- 1st classified MS2
- 2nd classified MS2
- 3th classified MS2

G.8.2.1 The Organization reserves the right to add new prizes throughout the development of the Competition.

## V International Competition MotoStudent

### SECTION H: ADDITIONAL INFORMATION

## ARTICLE 1: OFFICIAL DOCUMENTS

### H.1.1 Claim model

Mr/Ms \_\_\_\_\_ with personal ID-number \_\_\_\_\_, as tutor/team leader of the team \_\_\_\_\_, representing University of \_\_\_\_\_ with bike number \_\_\_\_\_ participant in the Category \_\_\_\_\_, hereby (*mark with X*):

**CLAIM** to the Organization of the V International Competition MotoStudent:

**COMPLAINTS** team \_\_\_\_\_ with bike number \_\_\_\_\_:

For that reason it considers violated the Article \_\_\_\_\_ of the Competition Regulations where it stipulates:

Also provides the following evidences to be taken into account by the Organization when verifying this claim:

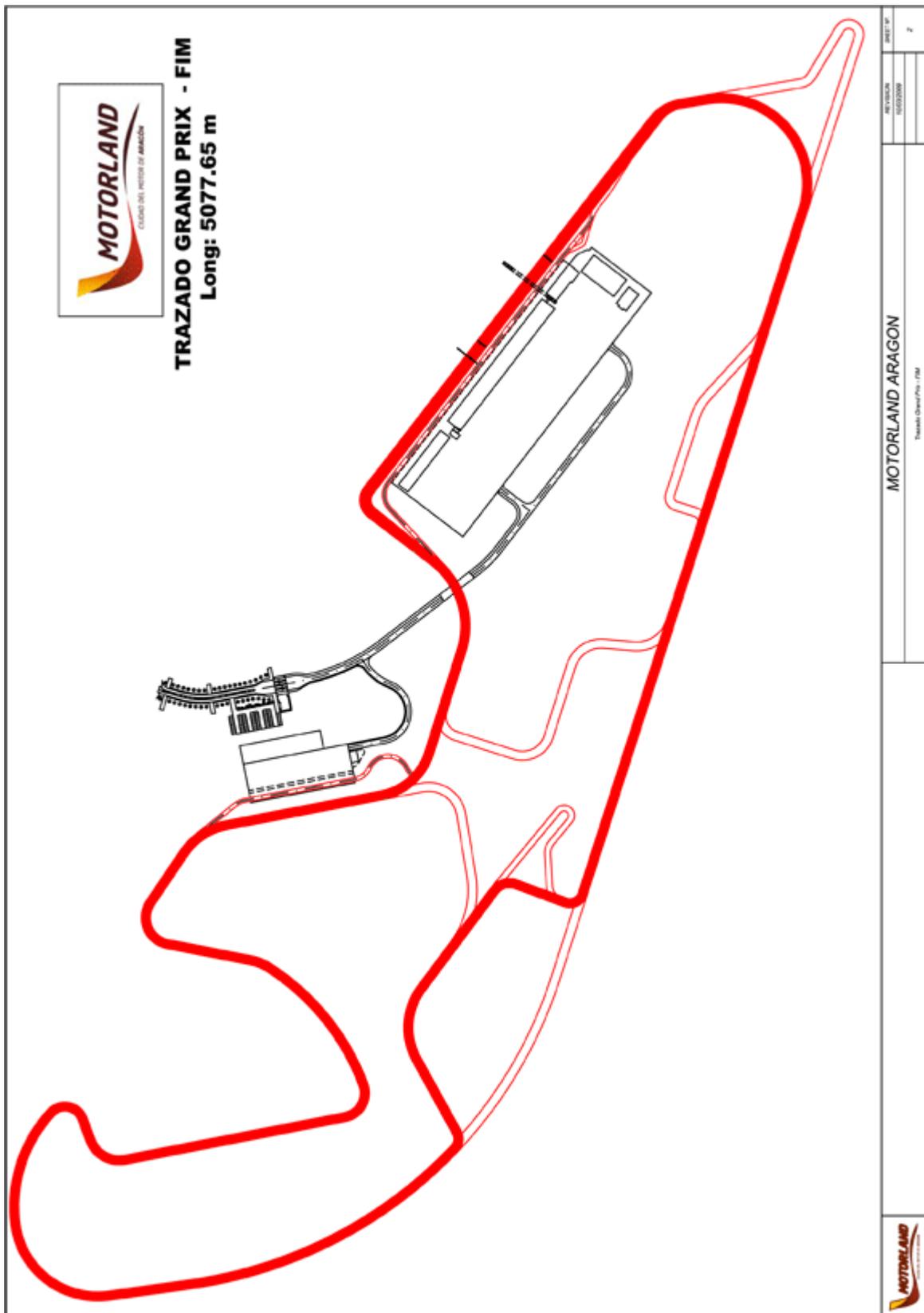
And for the record, signs this document in \_\_\_\_\_, on \_\_\_\_\_, \_\_\_\_\_ 201\_.

Mr/Ms. \_\_\_\_\_

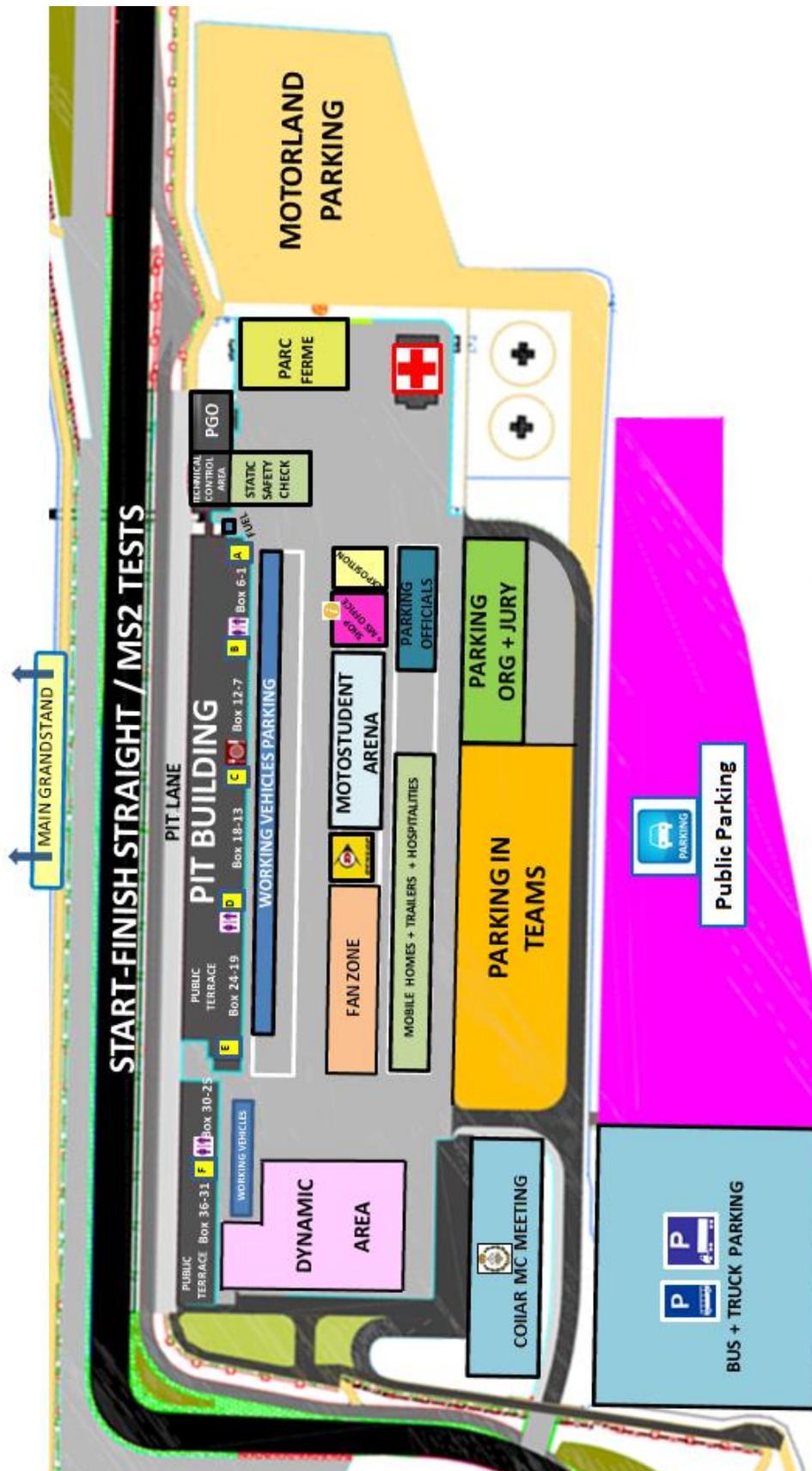
### H.1.2 Table of manufacturing cost for the production motorbike

 <b>MANUFACTURING COSTS</b> 		
CONCEPT	Cost (€)	Unit
<b>Labor</b>		
3th level worker mechanics/laborer/machining/ maintenance	11	hour
2nd level worker mechanics /machining/ maintenance	14	hour
1st level worker mechanics /machining/ maintenance	18	hour
Administrative	15	hour
Industrial or Technical Engineer	24	hour
Chairman	28	hour
<b>Materiales</b>		
Steel	2	kg
Stainless steel	4	kg
Aluminium	5	kg
Carbon fiber, 1 ply	150	kg
Fiberglass, 1 ply	75	Kg
Paint	13	Kg
<b>Componentes</b>		
PETROL -Basic engine (Without exhaust, intake and electronics)	950	Unit
PETROL - Inyection kit / Carburetor	72	Unit
PETROL - ECU	110	Unit
ELECTRIC - Basic motor	950	Unit
ELECTRIC - Controller	1000	Unit
ELECTRIC - Battery cell 40 A.h	65	Unit
ELECTRIC - Converter	90	Unit
Front tyre	60	Unit
Rear tyre	80	Unit
Front brake caliper	90	Unit
Rear brake caliper	75	Unit
Front brake disc	86	Unit
Rear brake disc	70	Unit
Front brake pad	24	Unit
Rear brake pad	18	Unit
Front rim	78	Unit
Rear rim	85	Unit
Right Handle	28	Unit
Left Handle	12	Unit
Rear shock + spring	102	Unit
Transmission chain	65	Unit
Windscreen	27	Unit
<b>Services</b>		
Electric supply	0,124	Kwh
Water	0,0017	litre
Trash	10,56	month
Cleaning	0,69	m2/month

ARTICLE 2: TRACK LAYOUT



ARTICLE 3: ORIENTATIVE VENUE MAP



## V International Competition MotoStudent

### SECTION I: MODIFICATIONS GLOSARY

This Section will reflect the possible updates defined in subsequent revisions of the Competition Regulations

**EVERYTHING NOT PERMITTED AND SPECIFIED IN THESE REGULATIONS IS STRICTLY FORBIDDEN**