ROCKET
COMPETITION SPECIFICATIONS

VERSIONS			
Version	**Date**	**Explanation**	**Changes**
1.0	**01.01.2022**	**First Version**	**-**

1. DEFINITIONS

- **PAYLOAD:** Systems that must be launched to a certain altitude by rocket and safely landed after stage or rocket component separation, and that are designed to perform a specific mission (scientific, when required).
- **ROCKET:** A transport vehicle that can be powered by various fuels, as stated in the document, that can come in various sizes for the performance of various tasks depending on the payload, and that is designed to deliver the payload safely to a specified altitude. The limits and criteria related to the design of the rockets are specified in the document.
- **GUIDE TO SUCCESS:** Document created by the Competition Committee to ensure a safe and successful competition, but which are not to be interpreted as actual rules.
- **CATEGORY:** Competition area options created in accordance with the criteria determined by the Competition Committee. The competition is held in four (4) different categories in which contestants are invited to design rockets of different thrusts and sizes.
- **IGNITION WIRE:** A wire in the burner section that ignites the fuel and/or flammable material when an electric current is passed through its open end.
- **LAUNCH STATION:** The station to be provided by the Competition Committee for the rocket launch.
- **GROUND STATION:** Stations developed to provide communication between the rocket and team during flight.
- **ENGINE:** The section of the rocket that provides the thrust.
- **ENGINE CLASS:** The rocket engine thrust level ranges determined according to international standards.
- **TELEMETRY DATA:** The collective of meaningful data collected from sensors on the system during flight that is transmitted to the ground station.
- **FLIGHT COMPUTERS:** It consists of the computers to control the flight and to provide communication between the rocket and the ground station.
- **FLIGHT CONTROL COMPUTER** A subsystem in which relevant data from sensors is collected, stored and managed facilitating flight control. The separation and recovery systems found on the rocket are managed by the flight control computer.
- **COMMUNICATION COMPUTER:** Computer ensuring the transmission of telemetry data from the rocket to the ground station throughout the flight. Communication computers can be standalone systems or integrated with the Flight Control Computer.
- **EYE BOLT:** An intermediate element that is shaped like an eye that is used to connect the parachute to the other systems in the rocket.
- **COMMERCIAL SYSTEM:** The term “commercial system” relates to two subsystems (Flight Computers and Engine). Commercial engines and flight computers are designed and manufactured by the vendor, and are provided ready for use.
- **COUPLER:** The parts used to connect the two body tubes of the rocket to each other. The outer diameter of the coupler is the same size as the inner diameter of the designed rocket.
- **LAUNCH RAIL:** The launch station from where the rocket is launched, inclined at a specific angle to the ground in accordance with the competition arrangements.
- **STATIC MARGIN:** A unitless value obtained by subtracting the distance between the centre of gravity and the nose cone tip (X_C) from the distance between the centre of pressure and the nose (X_{CP})), divided by the largest diameter of the rocket (D_n)).

$$\frac{X_{CP} - X_C}{D_n} = SM\ (X = 0, Nose\ cone\ tip)$$

- **REUSABLE ROCKET:** Reusable components are components that can be reused in the event of there being no hindrances to mission performance, and can be identified through component controls (body tube, flight computer, engine etc.) after the recovery of a rocket that has been launched. A rocket that consists entirely of reusable components is a reusable rocket.
- **REUSABLE PAYLOAD:** A Payload is considered reusable if no damage is detected after the necessary examinations are made after it has landed independently of the rocket.
- **APOGEE:** The highest altitude reached by the rocket during a flight.
- **RAIL BUTTON:** A guiding component that is mechanically attached to the rocket's body tube and that ensures the rocket is positioned linearly on the launch rail. The rocket body tube is mounted with two rail buttons mounter in line. The teams are responsible for the integration of the rail buttons onto the rocket body. The placement of the rail buttons is checked by the competition referees.
- **RISK ANALYSIS:** An analysis that the participating teams must complete assessing certain aspects of their rocket designs.
- **CHECKLIST:** A list specific for each project that is prepared by the teams to check that all of their materials are present in the competition area and that the integration process has been followed in full.
- **STAGED ROCKET:** Rocket systems with more than one propulsion system and that separate and release from the main system in stages during flight. These rocket systems come in two categories, being parallelly or serially staged. In this specification, the term "staged rocket" refers to a serially staged system.
- **DROGUE PARACHUTE:** Parachute deployed at the apogee that brings the rocket's velocity down to a certain level, ensuring a controlled, drift-free decrease in altitude until the main parachute is deployed.
- **MAIN PARACHUTE:** The parachute that ensures that the rocket, having been slowed to a certain speed by the drogue parachute, is further slowed to a velocity at which it can safely land.
- **OPEN ROCKET:** An open source in the rocketry field allowing for rocket design and the flight simulation of the designed rocket (*more information can be found at http://openrocket.info*)
- **NON-COMPETING FLIGHT:** Non-scored flights by teams that have obtained the necessary security labels from the referees on the competition site, but which have not obtained the necessary permits to make a flight in accordance with the competition specifications.
- **TEKNOFEST ROCKET COMPETITION COMMITTEE:** The authorized committee, composed of representatives of the Turkish Technology Team Foundation, ROKETSAN Inc., responsible for the planning, coordination and execution of the TEKNOFEST Rocket Competition.

2. INTRODUCTION

The principal goal of the TEKNOFEST Rocket competition organized by ROKETSAN under the auspices of Turkish Technology Team (T3) is to increase the interest of young Turkish people in aviation, space and technology; to support young people interested in rockets and missiles; to encourage young people to research the technologies of the future; to help them get accustomed to professional design procedures; and to build awareness among society on the success of young people, increasing the nation's confidence in the future. The participants, with backgrounds in various disciplines, gain the capabilities needed for technical reporting by working (analysis, design, production, testing and control etc.) as teams. In addition, by meeting and exchanging ideas with other teams with similar interests and with professionals working in the field, the teams develop themselves with innovative ideas.

The Rocket Competition, the first of which was held in 2018 as part of TEKNOFEST, is the first such event in Europe and the second in the world. The previous four events attracted applications from 156, 570, 516 and 544 different teams, chronologically.

Allowing young people to produce and launch rockets of their own design will encourage them to make career choices focused on science, technology and engineering in the future. Using their knowledge in various fields of science and engineering, young people engage successfully in the design, production and integration of rockets through interdisciplinary thought and the planning of complex operations/processes. Students benefit from the experiences of other teams who carry out successful flights, and gain invaluable experience by observing different designs. Making their own designs and working with a system engineering vision, the young participants in the competition will:

- Determine the overall technical requirements of the system,
- Transform the overall system requirements into detailed requirements at subsystem and component levels before proceeding to the detailed design phase,
- Create the necessary work packages for the design and production stages,
- Coordinate and optimize information related to the design with teams of relevant disciplines (Aerodynamics, Avionics, Structural Integrity, Payload and Recovery Systems and Propulsion Systems),
- Complete the production, supply, test, integration and launch readiness processes for the production of the design,
- Ensure that the resulting product is verified and validated (verification and qualification of the designed system for the fulfilment of the targeted objective through analyses and/or simulations and/or tests),
- Carry out all processes, from the start (receipt of the specification) to the final stage (launching the rocket), in accordance with the Project Management principles.

The most important output of this competition is young people who love and value the job they do, who can organize well as part of a team, who are technically informed and have a good grasp of engineering, and who can predict risks, and carry out the necessary planning and execution accordingly. All actions are taken to ensure that the successful young people reached through the competition go on to contribute to ROKETSAN and Turkey. In all, 19 (nineteen) of the young graduates who participated and succeeded in the competition in previous years took advantage of the opportunity to start a career in ROKETSAN, while 22 (twenty-two) students joined our internship programme.

Applications for the Rocket Competition, which is to be held for the fifth time in 2022, are to be made to the official website of the Aerospace and Technology Festival TEKNOFEST Technology Competitions (www.teknofest.org) by 28 February, 2022.

All of the teams that qualify for the competition and make it to the final shall receive a Participation Certificate.

3. REQUIREMENTS

3.1. BASIC REQUIREMENTS FOR ALL CATEGORIES

3.1.1. The competition consists of four categories:

- High School Category (5,000 feet)
- Medium-Altitude Category (10,000 feet)
- High-Altitude Category (20,000 feet)
- Challenging Task Category (10,000 feet)

3.1.2. Competitors participating in the competition are expected to design and produce a rocket that meets the requirements specified in the Competition Specifications, and to successfully launch and fly the rocket and complete its mission using a rocket engine provided to the finalists by the Competition Committee.

3.1.3. Only High School students can participate in the Competition's High School Category.

3.1.4. High school, associate, undergraduate and graduate students and graduates can participate in the competition's Medium-Altitude Category.

3.1.5. Associate, undergraduate and graduate students and graduates can compete in the High-Altitude and Challenging Task Categories.

3.1.6. Mixed teams comprising members from different education/training institutions can participate in the competition.

3.1.7. Associate, undergraduate and graduate students and graduates can only apply for the High-Altitude and Challenging Task categories if they have been part of a team that was deemed eligible to launch at least once in rocket competitions held in Turkey and/or abroad, and have made it to the launch area.

3.1.8. Participation as a team is mandatory.

3.1.9. Teams shall comprise a minimum of six (6) and a maximum of ten (10) people. A maximum of 6 members can be present in the area.

3.1.10. No individual can be a member of more than one team.

3.1.11. Each team must participate in the competition with one (1) advisor. The requirements related to the team advisor are given in the relevant article.

3.1.12. A team can only apply for one category. If a team applies for two different categories, the team (and its members) shall be disqualified without evaluation.

3.1.13. Each team can participate in the competition with only one (1) rocket.

3.1.14. Applications made after the deadline shall not be taken into consideration.

3.1.15. Competitors are responsible for preparing the necessary calculations, reports, presentations and other relevant documentation in accordance with the standards set by the Competition Committee.

3.1.16. After the application deadline, the teams shall prepare, in this order, a Preliminary Design Report (PDR), a Critical Design Report (CDR), a Launch Readiness Report (LRR) and a Post-Launch Evaluation Report (PLER).

3.1.17. A flight simulation report shall be prepared and delivered in both the PDR and CDR stages.

3.1.18. Following the submission of each report, the teams shall be evaluated by the referees, who are experts in their fields, and those that qualify to advance to the next report stage shall be determined.

3.1.19. The deadlines for the submission of the reports are as specified in the Competition Calendar.

3.1.20. Teams are responsible for preparing their Project Plan, Project Budget, Checklist and Personnel List (including the Team Advisor).

3.1.21. The teams are responsible for determining international students and participants at the PDR stage.

3.1.22. The teams are responsible for listing all team members that will participate in the competition and the team advisor in all the reports (PDR, CDR, LRR, PLER) they prepare.

3.1.23. The teams are responsible for using the engine provided to them by the competition committee.

3.1.24. The advisor must meet the following criteria.

3.1.24.1. The advisors shall be teachers/academicians employed in education/training institutions, or members or advisors of teams that have participated in rocket competitions held previously in Turkey and/or abroad, who meet the below requirements.

3.1.24.2. Persons who will act as advisors must upload with a CDR a document showing that they are employed as a teacher/instructor/academician by the relevant education/training institution, and that they have been assigned as the advisor to the competing team by the institution.

3.1.24.3. An original version of the related document stating that the person will serve as an advisor must be uploaded to the system with the CDR.

3.1.24.4. In the event of the advisor being replaced, the relevant TEKNOFEST Competition Committee must be informed immediately in writing.

3.1.24.5. The advisors of High School teams must be a science teacher, or a teacher of any subject who has previously participated in rocket competitions in the country or abroad. (This condition shall not apply to the DENEYAP or BİLSEM teams)

3.1.24.6. In the event of the team being awarded a prize, the advisor shall not benefit from the award.

3.1.24.7. The faculty member/academic advisors to university teams must be an academician (research assistant, lecturer) in any faculty in the field of Engineering and Science, or an academician of any field who has previously participated in rocket competitions in the country or abroad.

3.1.24.8. For the teams comprising graduates, the advisor must be a lecturer/academician from any field who has participated in rocket competitions in the country or abroad.

3.1.25. The team must have a team captain.

3.1.26. All information given by the TEKNOFEST competition committee throughout the competition process shall be addressed to the person appointed as the communications officer by the team. Accordingly, each team must designate a contact person.

3.1.27. The communications officer is tasked with the tracking of processes (Application, Report Upload Deadline, Forms to be Filled etc.). The TEKNOFEST committee will not be held responsible for any delays or disruptions attributable to the communications officer.

3.1.28. Applications are to be made online via the application system on www.t3kys.com until 28.02.2022.

3.1.29. The team captain/advisor registers their team on the system during the application. They ensure the full and correct registration of the advisor and/or team captain/members, in and sends them invites by e-mail. The invited member logs into the Application system to accept the invite, found in the “Team information” section, and the registration is duly completed. Otherwise, the registration will be incomplete.

3.1.30. All necessary processes throughout the competition (Application, Report Reception, Report Results, Financial Assistance Application, Objection Processes, Member addition/removal transactions etc.) are carried out via the KYS system. Teams must keep track of their processes via the KYS system.

3.1.31. Member addition/removal transactions are allowed up until the delivery date of Critical Design Report.

3.1.32. Throughout the competition, the application, report uploading and form filling transactions via the KYS falls under the authority of the Team captain and/or advisor, as the managers of the competition processes.

3.1.33. Competitors shall participate in the competition after reading and acknowledging all related statements and the conditions of participation (the submission of an application is deemed to indicate the acceptance of the rules by the competitor).

3.1.34. Monetary prizes shall be given to the three highest ranking teams in each category, provided that they meet the criteria. The award criteria and prize amounts are explained in the related section.

3.1.35. In the rocket competition, "Best Team Spirit" and "Most Unique Design" awards will be given in the four (4) categories.

3.1.36. The TEKNOFEST Competitions Committee is authorized to limit the number of team members present in the Rocket Competition area for any reason. In the event of such a limitation, the necessary information shall be provided by the Competition Committee.

3.1.37. Transportation and accommodation support for the finalist teams is limited. The teams shall be notified later

of the number of people that will receive support by the TEKNOFEST Rocket Competition Committee.

3.1.38. Under no circumstances is the TEKNOFEST Rocket Competition Committee responsible for any injury or damage caused by any competitor, or by any products delivered by the competitors.

3.1.39. The TEKNOFEST Rocket Competition Committee assumes no responsibility for damage caused by the competitors to third parties.

3.1.40. The TEKNOFEST Rocket Competition Committee is not responsible for ensuring that the teams prepare and implement their systems within the framework of the laws of the Republic of Turkey.

3.1.41. The TEKNOFEST Rocket Competition Committee reserves the right to make changes to this specification.

3.1.42. The applications of teams that do not meet the above conditions shall be considered invalid.

3.2. ROCKET REQUIREMENTS

In this section, the basic requirements of the rocket/vehicle are defined.

3.2.1. COMMON REQUIREMENTS

3.2.1.1. The teams are responsible for recovering the Payload, along with all components of the rocket (including subcomponents and subsystems) in a reusable condition following the launch. The use of parachutes to ensure recovery is mandatory.

3.2.1.2. Operation concepts have been determined separately for the individual categories, with two parachutes required in the Medium- and High-Altitude Categories ("Drogue Parachute" in yellow and "Main Parachute" in green in ***Figure 1***), and one parachute in the High School Category (Green parachute shown in ***Figure 2***). The Payload will be recovered with a separate parachute in all categories.

3.2.1.3. The rockets in the Medium- and High-Altitude Categories must carry out the operation concept given in **Figure *1*** as an example.

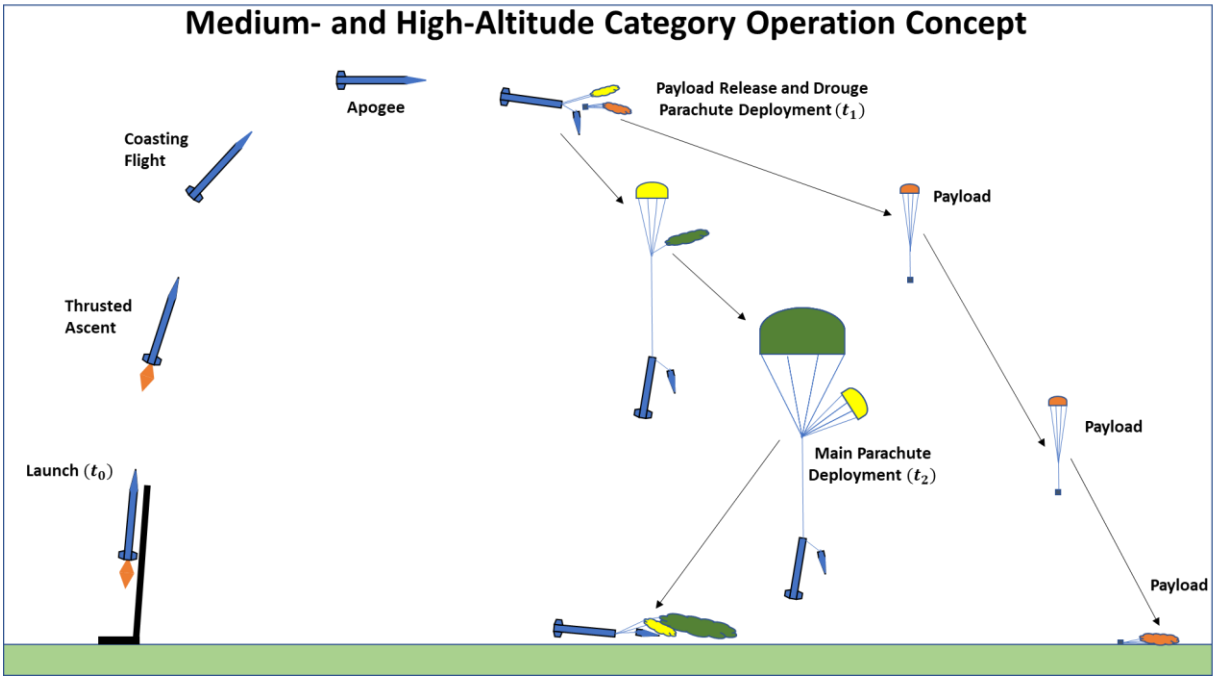

Figure 1. Medium- and High-Altitude Category Operation Concept

3.2.1.4. Rockets must release the payload at the apogee point and deploy the drogue parachute (yellow drag parachute in Figure 1).

3.2.1.5. Main parachute will be deployed at a maximum of 600 m and a minimum 400 m from the ground.

3.2.1.6. The rockets may not carry out any separation before reaching the apogee (Payload separation, parachute deployment etc.).

3.2.1.7. Rockets in the High School Category must carry out the operation concept given in **Figure *2*** as an example.

3.2.1.8. The rockets in the High School category will be recovered with a single parachute (No secondary parachute). The teams are responsible for recovering the rocket by ensuring that the parachute is deployed at the apogee and for separating the payload from the rocket at the apogee.

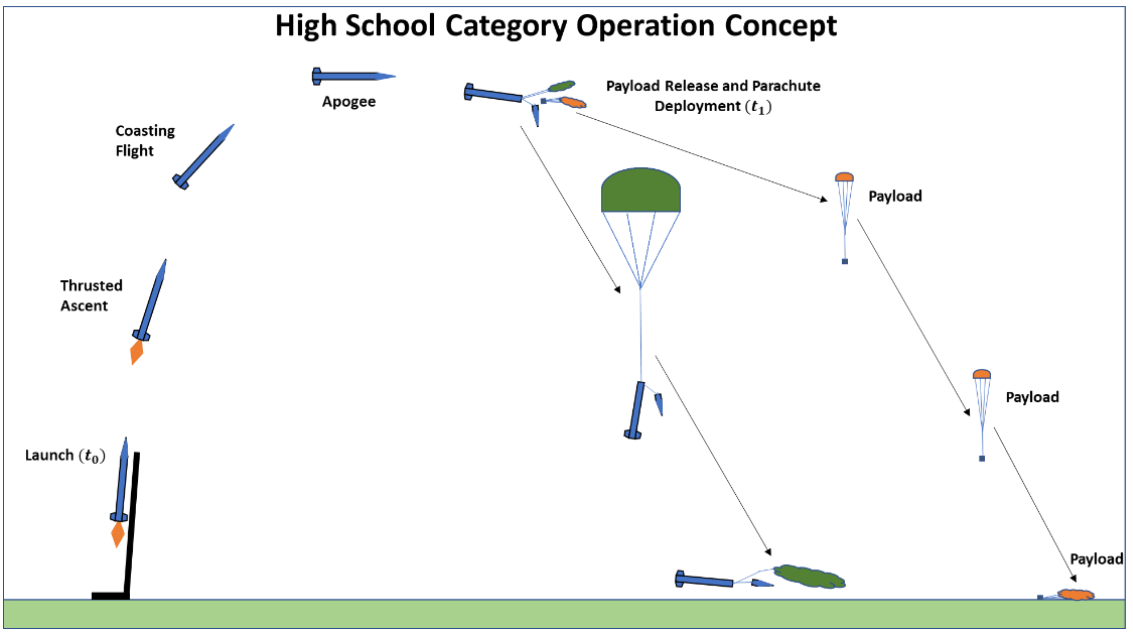

Figure 2. High School Category Operation Concept

3.2.1.9. The operation concept of rockets in the Challenging Task category is defined separately in the relevant section.

3.2.1.10. The engines to be used by the teams in the TEKNOFEST Rocket Competition shall be supplied and provided by the Competition Committee, and not the teams themselves.

3.2.1.11. The engines to be provided by the Competition Committee to the teams in the TEKNOFEST Rocket Competition are standardized for each category as follows.

3.2.1.11.1. Engine model L1050 for the High School Category,

3.2.1.11.2. Engine model M2020 for the Medium-Altitude Category,

3.2.1.11.3. Engine model N5800 for the High-Altitude Category,

3.2.1.11.4. Engine model M1545 for the Challenging Task Category.

3.2.1.12. One (1) engine shall be provided by the TEKNOFEST Rocket Competition Committee to the teams with qualifying Launch Readiness Reports (LRR) on the day of assembly/integration, on the field.

3.2.1.13. The engine supplied to the teams shall be ready for assembly/integration with the rocket.

3.2.1.14. It is strictly forbidden for teams to design or manufacture any engine or related sub-components (*For the High School, Medium- and High-Altitude and Challenging Task categories, the heat, gas, etc. emitted by the engine are not factors that have an effect on the rocket design*).

3.2.1.15. For the High School, Medium- and High-Altitude categories, parallelly or serially staged rocket designs and multi-engine systems in a single frame, termed as clusters, are not included within the competition concept.

3.2.1.16. The teams that will compete in the High-Altitude category shall produce rocket designs appropriate for the engine to be specified by the TEKNOFEST Rocket Competition Committee. Rocket designs for engines other than the one to be provided by the TEKNOFEST Rocket Competition Committee shall not be accepted.

3.2.1.17. One referee altimeter will be delivered to each launch-qualified team by the TEKNOFEST Rocket Competition Committee at the end of the integration/assembly day to record the maximum altitude reached by the rockets.

3.2.1.18. The teams shall be responsible for charging the altimeters and operating them on launch day.

3.2.1.19. The teams performing the recovery must deliver the altimeters along with the recovered components of the rocket to the referee committee for evaluation, and the altitude data must be readable without any additional

intervention to the altimeter.

3.2.1.20. The payload will be recovered separately from the rocket, whereas the rocket parts will all be recovered together. There shall be a system (GPS, radio transmitter) pinpointing the locations of both the payload and the parts in question.

3.2.1.21. Teams are required to make flight simulations in accordance with the “Open Rocket Simulation” menu (**Figure *3***). Teams that have not included the simulation described in **Figure 3** in their Open Rocket file shall not be evaluated.

3.2.1.22. Rockets shall be launched at an elevation angle of 85° from the ground and an azimuth to be determined by competition referees according to the prevailing wind direction. The launch rail will be 6 m long. (Technical drawing related to the launch rail is included in Annex-2.)

3.2.1.23. Teams shall not enter their Payload as "*Unspecified Mass*". The payload shall be named "PAYLOAD", and its mass shall be entered as 4000 grams (4 kg) minimum as a single piece. The values on the "Launch Simulation" screen seen in **Figure 3** should be entered into the simulation. Teams that fail to carry out the simulation using these values shall be disqualified.

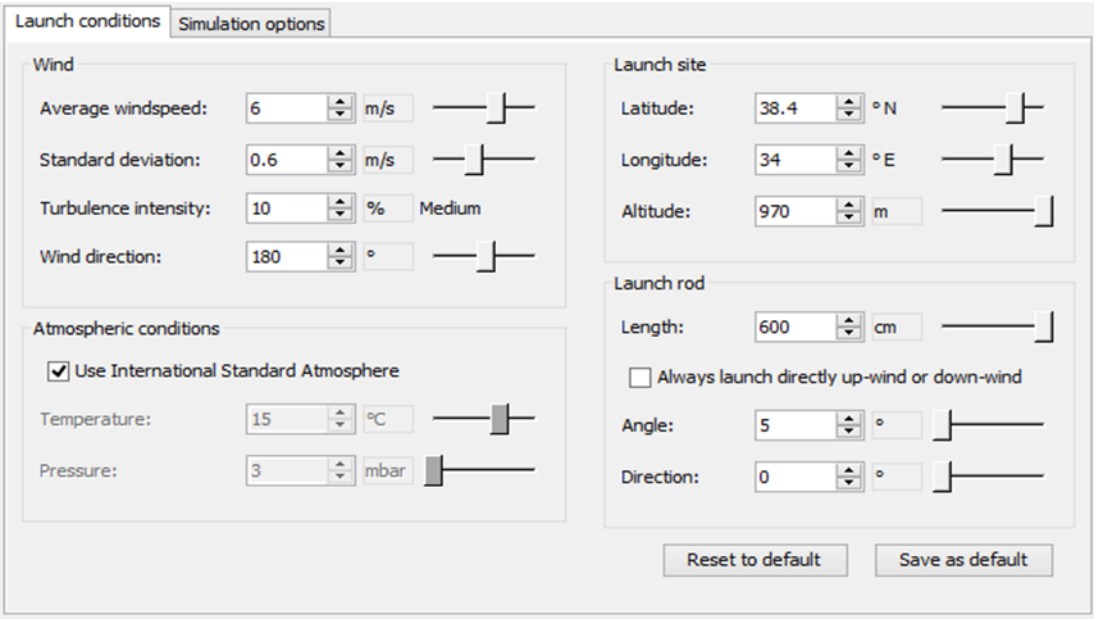

Figure 3. Launch Simulation-Launch Simulation Screen

3.2.1.24. All requirements in all report templates shall be considered part of this specification.

3.2.2. RECOVERY SYSTEM REQUIREMENTS

This section contains the basic requirements for the recovery system. The same recovery system requirements apply to all competition categories (Except for High School category).

3.2.2.1. The system of parachute must be used for the recovery system.

3.2.2.2. In order to prevent damage to the rocket and its parts, the velocity of the loads carried by the main parachute must be 9 m/s maximum and 5 m/s minimum.

3.2.2.3. The drogue parachute must be able to prevent the rocket from tumbling. This parachute must reduce the descent rate of the rocket to a rate not be less than 20 m/s.

3.2.2.4. For the High-School Category:

3.2.2.4.1. All parts of the rocket in the High School category must be recovered with a single parachute system as an interconnected whole.

3.2.2.4.2. In order to prevent damage to the rocket and its parts, the velocity of the loads carried by the single parachute used in the High School category must be 9 m/s maximum and 5 m/s minimum.

3.2.2.5. The Payload must be landed “independently” with its own parachute, without any connection to the rocket parts (*no equipment such as shock cord connecting to any point*).

3.2.2.6. For the recovery of the payload, a system involving chemical hot gas generators (black powder etc.), pneumatic, hydraulic mechanics or cold gas system should be first deployed to release it from the rocket.

3.2.2.7. Non-commercial pressure vessels (pressurized tanks, tubes, etc.) shall not be allowed in the parachute deployment process for safety reasons.

3.2.2.8. The teams will not be allowed to use their own pyrotechnic material in their hot gas generator systems. Teams using such systems will be provided with pyrotechnic capsules by the Competition Committee. These capsules will be provided ready for use to the teams at the competition site.

3.2.2.9. Teams bringing pyrotechnic materials to the site will be disqualified.

3.2.2.10. It is mandatory to fill commercial pressure vessels allowed in the competition within the integration site. The filling of commercial pressure vessels within the launch site is strictly forbidden.

3.2.2.11. Once all labels have been received, the teams shall receive their hot gas generators from the referees and integrate them into their rockets under referee supervision.

3.2.2.12. The communication computers on the system will share uninterrupted real time locational data with the ground station.

3.2.2.13. Each parachute will be distinctly coloured and easily distinguished by the naked eye from a distance (it is of crucial importance that the parachutes not be white, blue or any shades of these colours).

3.2.2.14. The teams are required to recover the payload and all of the rocket components within a maximum of one hour during the recovery operation.

3.2.2.15. Teams not having transmitted locational data in accordance with the telemetry data-sharing rules detailed in the site requirements will not be allowed to continue with post-launch recovery operations.

3.2.3. PAYLOAD REQUIREMENTS

3.2.3.1. The payload must have a mass of at least four (4) kilograms.

3.2.3.2. The payload mass shall be measured by the referee committee in the integration area, and so the design and production must facilitate the easy removal of the Payload from the rocket for weighing.

3.2.3.3. In the High School category, the payload shall not be required to fulfil any scientific task. Any weight of at least 4 kilograms may be considered as the Payload in this category.

3.2.3.4. The payload, which is separated from the rocket at the apogee in the Medium-Altitude category, must transmit the pressure, temperature, and humidity data of the atmosphere to the ground station at a frequency of 5 Hz (5 units of data every second for each data group).

3.2.3.5. Rockets in the High-Altitude Category must carry a camera and transmit video images to the ground station in real time.

3.2.3.6. In the High-Altitude and Challenging Task categories, successful teams will be rewarded independently of the cash rewards defined for the competition if the payload successfully performs a scientific mission detailed in Annex-3.

3.2.3.7. Payloads to be used for the carriage of scientific tasks cannot contain live organisms, corrosive chemical materials or radioactive materials, and must not be harmful to the environment/organisms.

3.2.4. AERODYNAMIC REQUIREMENTS

3.2.4.1. Rockets that will compete in the High School, Medium-Altitude and Challenging Task categories must fly at subsonic (below Mach 1) speeds.

3.2.4.2. There is no flight speed limitation for rockets that will compete in the High-Altitude category.

3.2.4.3. The maximum outer diameters of all parts of the rocket must be of the same value *(Stages of different diameters and diameter changes between stages are not allowed. Boat-Tail use is allowed in line with rail positioning restrictions.)*

3.2.4.4. Flight control surfaces must be fixed. Moving control surfaces and active control are not allowed.

3.2.4.5. Rockets in all categories must have a stability value of between 1.5 and 2.5 at Mach 0.3.

3.2.4.6. In the main design page of Open Rocket, the stability value is calculated for Mach 0.3, which is the value to be considered by the teams.

3.2.4.7. The minimum rail exit velocities are as follows: 15 m/s in the High School Category, 25 m/s in the Medium-Altitude Category, 30 m/s in the High-Altitude Category and 20 m/s in the Challenging Task Category.

3.2.5. STRUCTURAL INTEGRITY REQUIREMENTS

3.2.5.1. The internal and external pressure of the rocket must be in balance. To ensure pressure balance, a minimum of three (3) holes with diameters of 3.0–4.5 mm must be located between the nose cone and the frontal part of the body tube, in the body tube part housing the avionics systems, and in the body tube section between the rear part of the body tube and the engine.

3.2.5.2. Rockets must be resistant to structural loads both during flight, and during transport/placement on the rail. In the Medium-Altitude, High-Altitude and Challenging Task categories, the teams will show the forces to which their rockets will be subjected with analyses and calculations.

3.2.5.3. PVC, compressed paper/kraft and PLA may not be used as aerodynamic surface (body tube, fin, nose cone) materials. The team will be eliminated if a material is present the integrity of which has not been tested in strength-critical parts of the aerodynamic surfaces or inside the rocket, and that has not been specified in the design reports.

3.2.5.4. Only one-piece forged steel eye bolts are to be used. The use of bent eyebolts is forbidden. This rule applies to any part that can replace eyebolts or be subject to similar forces as eyebolts.

3.2.5.5. Nose cone shoulder must have a diameter of at least one and a half (1.5) times the outer diameter of the body tube. Couplers are expected to have a diameter of at least 0.75 times each of the outer diameter of the body tubes into which they will be integrated. Failure to comply is grounds for disqualification. A sample nose cone shoulder is provided in **Figure *4*** and sample coupler is provided in **Figure *5***.

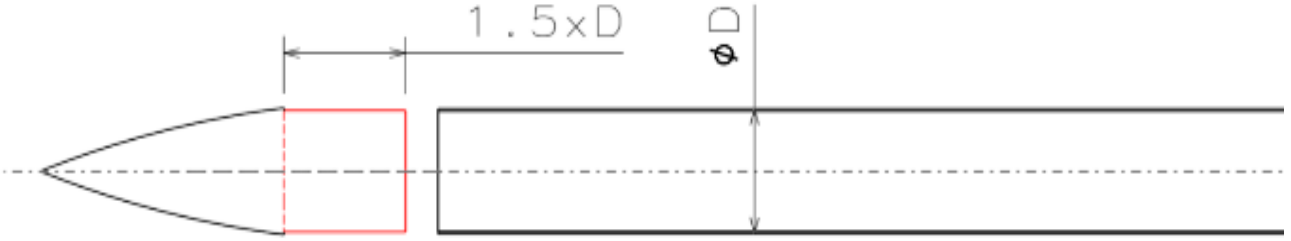

Figure 4. Nose Cone Base

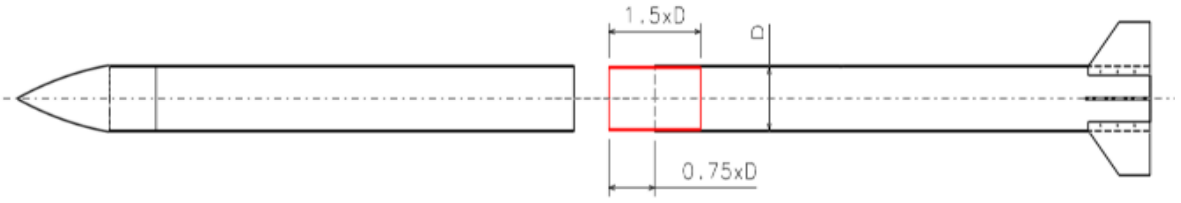

Figure 5. Coupler

3.2.5.6. The rail buttons will be provided to the teams by the TEKNOFEST Rocket Competition Committee at the competition site after the weighing of the Payload.

3.2.5.7. The rail buttons must be attached to the structurally reinforced parts of the body tube. Each rocket must have a minimum of two (2) rail buttons. One should be located on the engine area, between the engine centre of gravity and the end of the body tube. The centre of gravity of the rocket must be between the two rail buttons.

3.2.5.8. A technical drawing of the supplied rail buttons can be found in ANNEX-2.

3.2.5.9. Any parts that protrude into the rocket's cross-sectional area and that may interfere with the structural/aerodynamic integrity of the rocket (*only essential elements such as sensors, antennas and cameras are allowed in this context*) must be fixed in such a way that they are located ahead of the center of mass of the rocket.

3.2.5.10. The flight computer and all switches on the payload must be located at most 2500 mm ahead of the rocket nozzle (**Figure *6***).

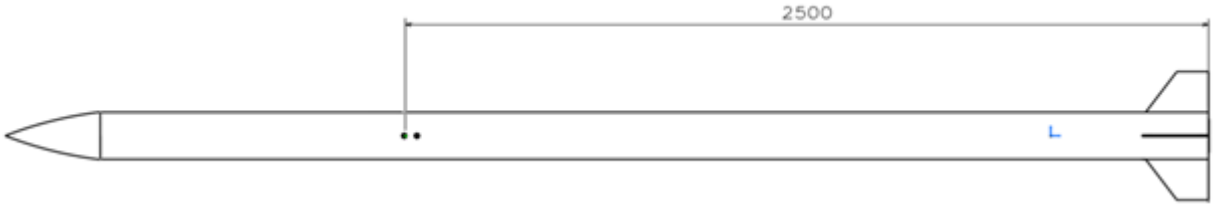

Figure 6. Maximum switch distances

3.2.5.11. The rocket engine must be assembled in such a way that disassembly is possible when needed once all body tube connections are in place.

3.2.6. AVIONICS REQUIREMENTS

3.2.6.1. The deployment and recovery systems found on the rocket are managed by the flight control computer.

3.2.6.2. The communication computer that ensures the transmission of telemetry data to the ground station can operate either standalone or integrated with the Flight Control Computer.

3.2.6.3. In the High School category, a minimum of one (1) flight control computer must be used (it is not required to use two (2) flight control computers).

3.2.6.4. In the High School category, at least one (1) flight control computer must be a commercial product.

3.2.6.5. High School teams that have developed their own flight control computers may use them only in addition to (as backup) the commercial (main) flight computer. High Schools opting to use such computers will be considered for the unique design award.

3.2.6.6. If the commercial flight control computer does not provide for a location and communication system, the teams are required to develop a communication computer separately.

3.2.6.7. In the Medium-Altitude category, the use of at least two (2) flight control computers is mandated. At least one (1) of these flight control computers must be an authentic flight-control computer. At least one (1) of the flight control computers used must provide the utility of a communication computer.

3.2.6.8. In the High-Altitude and Challenging Task categories, the use of at least two (2) flight control computers is mandated. Each of the two flight control computers must be authentic. At least one (1) of the flight control computers used must provide the utility of a communication computer.

3.2.6.9. No electrical or wireless connection is permitted between the flight control computers used in the system.

3.2.6.10. The flight control computers must be completely independent of each other. Each computer must have its own processor, sensors, power source and cabling.

3.2.6.11. The flight control computers used are connected to the deployment system actuator via electric lines, cables etc. (each line should be independent).

3.2.6.12. In the event of the partial or complete failure of one of the flight control computers and/or one of the systems to which they are connected, the others must be able to perform the rocket's recovery functions without interruption.

3.2.6.13. The flight control computers must have at least two (2) sensors, and data from these sensors must be used in the flight control algorithm.

3.2.6.14. There must be at least one (1) barometric pressure sensor in all flight control computers.

3.2.6.15. In the event of two (2) barometric pressure sensors being used in the flight control computers, the sensors must be different from each other (Sensors used in different flight control computers may be the same as each other).

3.2.6.16. In the flight control algorithm, the deployment system must not be triggered by data from GPS.

3.2.6.17. Actuators connected to deployment systems do not have to be redundant *(spring in a spring system, DC motor or ignition wire in a DC motor system)*.

3.2.6.18. If there is a single actuator, it must be controlled by both the main and backup flight computer. These actuator systems must not be operated in an uncontrolled manner *(for example, upon system startup and setup), so as* to ensure that the deployment system is not activated accidentally.

3.2.6.19. It must be impossible for deployment systems to be activated involuntarily.

3.2.6.20. All teams must have a ground station to receive real-time data from their rockets and payloads.

3.2.6.21. The ground station requirements are listed as follows:

3.2.6.21.1 To launch the recovery of the rockets, the location data of the rocket must have been transmitted to the Ground Station in real time.

3.2.6.21.2 On launch day, the teams will have a maximum of two (2) minutes to establish communication with the ground stations after the rocket avionics are activated. Once this time has elapsed, the start-up/shutdown of systems shall not be allowed. Teams that have not established a stable communication by the end of the two (2) minutes can withdraw from the competition by removing their rocket from the rail, if they decide.

3.2.6.22. The fact that rocket parts will land far away from the ground station should be considered, and the range of the transceiver antennae should be chosen taking the flight trajectory of the rocket into account.

3.2.6.23. The link bandwidth must be budgeted by assessing the power of the RF module, and this must be presented in the relevant design reports.

3.2.6.24. The avionic subsystems and sensors on the rocket must be able to operate easily under such conditions as vibration, pressure, and shock during the flight. In this regard, the necessary protective measures must be taken, the relevant tests must be carried out during the design verification phase, and the results must be presented in the relevant design reports.

3.2.6.25. The flight computers on the rocket must be turned on and checked by opening the switches while the rocket is on the rail.

3.2.6.26. In the design and production of the rocket, it must be ensured that power can be supplied to the flight control computers from outside the body tube *(for example, there should be* an *accessible switch on the body tube)*. The starting of systems by using tools with ropes, shunts or screwdrivers etc. will not be permitted.

3.2.6.27. If any system connected to the rocket becomes active while the flight computer is turned on, the team shall be disqualified.

3.2.6.28. Design and production must be done in such a way that power can be supplied to the electronic circuits on the Payload from switches on the body tube of the rocket.

3.2.6.29. There shall be a mechanical on/off switch between any power source (accumulator, battery, supercapacitor, etc.) that supplies power to the system, and the first circuits they feed. When disconnected via a mechanical switch, the power supply element shall not be connected to any system element (including LED indicators, power converters, regulators).

3.2.6.30. Teams that use Li-Po or similar batteries in the system must use a "Li-Po Safe Bag".

3.2.6.31. The team shall be responsible for the safety of the battery to be used.

3.2.6.32. The batteries to be used must be sufficiently charged and capable of meeting the needs of the rocket.

3.2.6.33. At least two criteria that will trigger split sequences in the flight algorithms must be determined.

3.2.6.34. Decision-making parameters must be based on the data read from the sensors.

3.2.6.35. The data read from the sensors must not be used directly, and any incorrect reading or sensor error must be taken into account. The measures to be taken in such situations (such as filtering) must be explained in detail in the relevant design reports.

3.2.6.36. Authentic flight computers and all flight algorithms must be the team members' own unique designs. Team members should be able to explain the authentic systems in detail and in particular, they should be capable of changing flight algorithms. Teams whose designs are found to be unauthentic will be disqualified.

3.2.7. GENERAL SAFETY REQUIREMENTS

3.2.7.1. The materials, equipment, and processes to be used in design and production stages must not cause any harm to human health or the environment.

3.2.7.2. The design must be simple and robust (resistant to noise and uncertainties), and must minimize human error.

3.2.7.3. Planning and risk mitigation studies must be carried out for the design, production and testing processes,

and must be shown in the relevant design reports.

3.2.7.4. Factors that may pose a danger to the design, production, integration and launch days must be identified, and the necessary measures must be planned and implemented accordingly.

3.2.7.5. Any potential risks associated with the system that may pose a danger during the launch, flight or recovery phases must be listed in advance, and risk mitigation measures must be planned and implemented accordingly.

3.2.8. COMPETITION AREA REQUIREMENTS

3.2.8.1. Teams coming to the competition area are to stay in the launch area for two (2) days.

3.2.8.2. The first day is integration day, while the second is the launch day.

3.2.8.3. The activities to be carried out on these two days and the rules to be followed in the area are presented in detail in ANNEX-5.

3.2.8.4. All competitors must wear steel-toed work shoes when coming to the competition area. Otherwise, they shall not be admitted.

3.2.8.5. The competing teams are expected to collect the five (5) labels on integration/assembly day, within a maximum duration of nine (9) hours.

3.2.8.6. The teams are responsible for the safe delivery of their rockets to the competition area.

3.2.8.7. Teams that fail to complete the integration/assembly and conformity checks on time shall under no circumstances be allowed to launch their rockets. (*Note: It is recommended that the rockets consist of modular and quickly integrable sub-systems, and that all designs and productions are done accordingly)*

3.2.8.8. At the end of the integration/assembly day, the engines of the teams that pass the conformity checks shall be attached to their rockets and kept by the TEKNOFEST Rocket Competition Committee in a completely deactivated state (*with the avionic systems turned off*) until the next day.

3.2.8.9. Teams that fail to follow the rules in the launch area *(the area where the integration, observation and launch activities will be carried out)*, as detailed in Annex-5, shall be disqualified.

3.2.8.10. Competitors shall not be allowed to use the below tools or equipment in the competition area (*the tools and equipment in question shall not be allowed in the checks to be made at the entrance to the area*). Teams must come to the competition area sufficiently ready to not need such equipment.

- Grinders, such as grinding motors, angle grinders, etc.
- Drills, such as drills connecting directly to a power source, etc.
- Milling cutter, hand milling machine, etc.
- Soldering equipment, such as soldering irons, etc.
- Staple and nail guns
- Buzzsaws and jigsaws

3.2.8.11. A workshop shall be established in the competition area by the Competition Committee to meet any production or modification needs that require the use of tools and equipment that are not allowed.

3.2.8.12. Teams are expected to complete the necessary production and integration/assembly activities before arriving on site. If the teams have to use the workshop made available by the Competition Committee, apart from the production and integration/assembly activities to be carried out by their own means when they arrive on site, penalty points (*penalty points to be applied depending on the duration of workshop use*) will be subtracted from their total score in the competition. The penalty points to be applied are specified in **Table 1**.

WORKSHOP USE TIME	PENALTY POINTS
Small-Scale Works *(Less than 5 minutes)*	5
Medium-Scale Works *(6–15 minutes)*	15
Large Scale Works *(16–25 minutes)*	25

Table 1. Penalty points to be applied in case of workshop use

3.2.8.13. The works requested by the teams from the workshop will be evaluated by the authorized Competition Committee member, and the scale of the work to be carried out (small-medium-large) will be given a value. After the valuation, the required penalty points will be applied to the overall evaluation of the team by the Competition Committee.

3.2.8.14. No support shall be received from the workshop for works exceeding 25 minutes and/or that go beyond the capacity of the workshop.

3.2.8.15. The overall support received from the workshop by a team cannot exceed 45 minutes.

3.2.8.16. The use of tools such as dremels, cordless screwdrivers, etc. is permitted.

3.2.8.17. Dangerous operations using dremels, cordless screwdrivers, etc. such as disk cutting, etc. tips will not be allowed.

3.2.8.17.1. Other situations that may lead to disqualification on integration/assembly day are:

- Failing to comply with the guidance and instructions of the integration/assembly area referees,
- Bringing prohibited materials and hand tools into the area (or attempting to do so),
- Failure to comply with Occupational Safety and Occupational Health (OHS) rules,
- Failure to comply with the pandemic measures detailed in ANNEX-6,
- Continuing to work with sharp, piercing or sparking tools, such as drills, soldering irons, etc. after the energetic material *(gunpowder and/or rocket engine)* has been provided,
- Failure to receive all five (5) green labels within the specified time,
- Failure to deliver the rocket to the TEKNOFEST Rocket Competition Committee after all five (5) green labels have been received within the specified time,
- Delivery of the rocket to the Competition Committee with an active power source and/or electrical component on the day of integration/assembly,
- Failure of the rocket to meet the minimum strength requirements on the rail.

3.2.8.17.2. Other circumstances that may lead to disqualification on launch day are:

- Failure to follow the directions and instructions of the launch officers,
- Loss of the team card (team card with green labels) received from the referees in the integration/assembly area indicating that the rocket can be launched,
- Exceeding the ten (10)-minute launch preparation window *(30 minutes for the Challenging Task category)*,
- Damaging the system during the launch preparation period in such a way that the flight of the rocket is prevented,
- Performing modifications/repairs/corrections to systems that have already received a green label during the launch preparation period,

- Powering up the avionics system on the rocket or the payload avionics without the permission of the authorized personnel,
- Activating the separation system for any reason at any stage prior to launch,
- Compromising the structural integrity of the rocket during its transportation to the rail or during loading onto the rail *(for example, separation of the nose cone or body tube)*,
- Failure to establish a connection between the flight computer (when the rocket is placed on the rail) with the ground station within two (2) minutes (*This criterion is limited to 10 minutes for the High School category*).

3.2.9. CHALLENGING TASK REQUIREMENTS

3.2.9.1. The teams that will participate in the Challenging Task category of the competition must have participated as undergraduate, postgraduate, and graduate teams in the Medium- or High-Altitude categories in previous years, and to have qualified for at least two consecutive launches.

3.2.9.2. In the Challenging Task category, the teams shall design serially staged rockets. *(Detailed information on staged rockets is provided in ANNEX-8).*

3.2.9.3. The rockets shall be designed in two stages. No more than two stages shall be allowed.

3.2.9.4. In the Challenging Task category, the "M1545" engine selected from the engine catalogue provided by the TEKNOFEST Rocket Competition Committee shall be used.

3.2.9.5. There shall be no engine in the second stage this year.

3.2.9.6. In this category, teams will design a rocket that will reach to a target altitude within the maximum altitude range of 7,500–10,000 feet.

3.2.9.7. The flight stages of the staged rocket are given in ***Figure 7***.

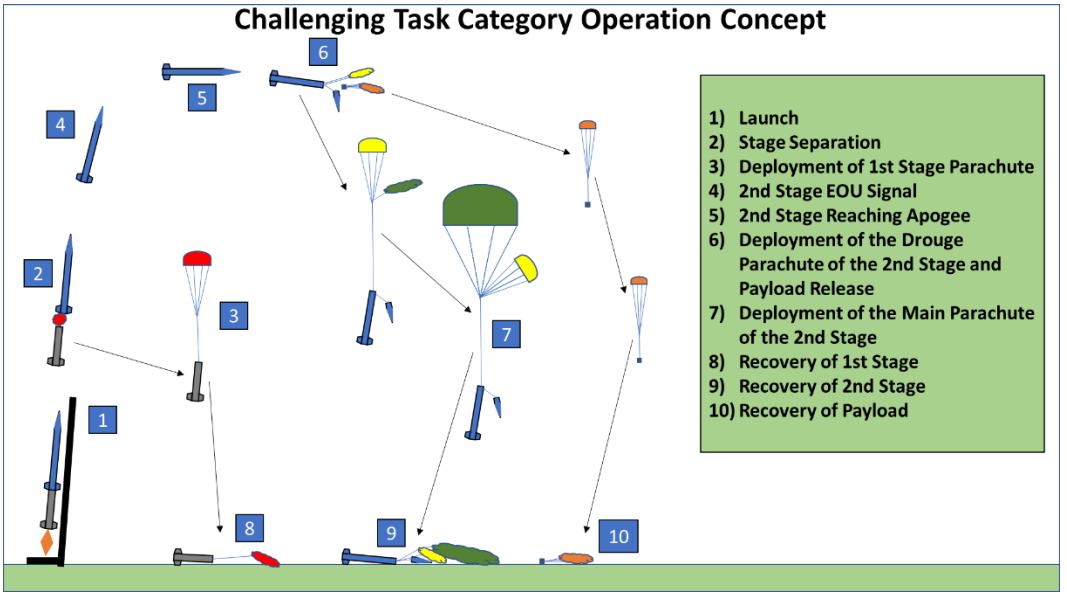

Figure 7. *Challenging Task Category Operation Concept*

3.2.9.8. Teams competing in the Challenging Task category are subject to the Recovery System Requirements (Section 3.2.2) while the rocket is in flight, after the rocket engine (at the bottom of the rocket) has been ignited and second stage ignition is signalled.

3.2.9.9. The static margin of the rocket at Mach 0.3 must be between 1.5 and 2.5.

3.2.9.10. The static margin value of the second stage at Mach 0.3 must also be between 1.5 and 2.5.

3.2.9.11. The teams shall present their target altitudes to the Competition Committee in the PDR and CDR. The value presented in the CDR shall be the final target altitude, and this altitude shall be taken into account in the flight evaluation.

3.2.9.12. Appropriate pneumatic/hydraulic/mechanical systems can be used alone or in combination as the Stage

Separation System.

3.2.9.13. The launch of the rocket from the ground shall be carried out by the TEKNOFEST Rocket Competition Committee, as is the case for all other categories.

3.2.9.14. An Electronic Observation Unit (EOU), to be delivered to the teams by the TEKNOFEST Rocket Competition Committee on the integration day, shall be placed on the second stage of the rocket.

3.2.9.15. The EOU contains electronic hardware, sensors, and a power supply, and has mechanical integrity.

3.2.9.16. The EOU shall be used to observe the stage separation and the position of the second stage after separation.

3.2.9.17. The EOU will observe the stage separation with the working principle detailed in ANNEX-7. The procedures the teams need to carry out for their designs in accordance with this principle are also shared in Annex-7.

3.2.9.18. As part of this task, the EOU will decide whether the stage separation has taken place safely by checking whether it meets the acceptance criteria given below.

3.2.9.19. The criteria observed for the acceptance of the stage separation signal by the EOU are orientation vectors and acceleration.

3.2.9.20. The EOU signals and data will be downloaded via the data link between the rocket and ground station, and delivered to the referees.

3.2.9.21. The components, operating conditions, and the mechanical *(size envelope, mass, etc.)* and electrical *(connection interfaces, etc.)* features of the EOU are stated in ANNEX-7.

3.2.9.22. Details of the communication between the EOU and the rocket's own flight computer (designed and produced by the teams) are presented in ANNEX-7.

3.2.9.23. The ignition to take place under EOU control, defined at the fourth stage in ***Figure 7***, will be a virtual one *(as physically there is no engine in the second stage)*.

3.2.9.24. After the ignition signal has been transmitted by the flight control computer to the EOU, the EOU shall receive the ignition signal once the second stage is in the appropriate position.

3.2.9.25. After the signal has been received by the EOU, the ignition signal will be sent to the ground station.

3.2.9.26. In addition to Open Rocket software, each team shall simulate the ballistic trajectory of the rocket using the flight simulation software they have developed.

3.2.9.27. All teams are required to carry out mechanical, structural and aerodynamic analyses and designs related to the stage separation mechanism, and to prove their validity in the design reports.

3.2.9.28. The criteria for the timing of the stage separation shall be determined by the competitors.

3.2.9.29. Analyses and evaluations showing the timing sequence for the stage separation, the recovery of the rocket components and the Payload shall be included in the PDR and CDR.

3.2.9.30. The evaluation of the teams competing in the Challenging Task category include the following:

3.2.9.30.1. Ensuring that all data are recorded correctly during the flight, and that this data *(including* separation of stages, etc.) is delivered simultaneously to the ground station,

3.2.9.30.2. Ensuring and proving that the stage separation has been carried out successfully based on the data and signals downloaded to the ground station via the data link,

3.2.9.30.3. Recovery of all parts of the rocket successfully through parachute deployment,

3.2.9.30.4. Delivery of the system that records the data to the TEKNOFEST Rocket Competition Committee in good condition, along with the recovered rocket components *(the data received from the system will be separately evaluated for correctness and readability)*.

3.2.9.31. Details of the realization of the stage separation sequence are presented below:

3.2.9.32. The second stage must be separated from the first stage through the use of pneumatic/hydraulic/mechanical systems at the 500 m altitude range, after the burnout. The use of any type of hot gas generator in the separation mechanism is forbidden.

3.2.9.33. A system based on an internal body pressurization technique cannot be used as a Stage Separation

System.

3.2.9.34. If pneumatic or hydraulic systems are used, it will be necessary to take the air pressure conditions at the altitude determined in the relevant flight simulations into account in the design.

3.2.9.34.1. Pressurized gas storage systems with no pneumatic or hydraulic system certification, and that are a product of indigenous design, are not permitted.

3.2.9.35. The avionic requirements related to stage separation are presented below:

3.2.9.35.1. At least three (3) of the criteria for stage separation in the flight algorithms must be met.

3.2.9.35.2. Stage separation should be done using the data obtained from the sensors.

3.2.9.35.3. The data used in the stage separation should be filtered to ensure that they are usable in avionics systems.

3.2.9.35.4. There shall be a total of 3 avionics systems in the rockets to be designed under the challenging task category.

3.2.9.35.5. There shall be a total of three (3) flight control computers on the rocket – one (1) communication computer in the first stage and two flight control computers in the second stage.

3.2.9.35.6. The main function of the communication computer, to be located in the first stage, is to share the position and velocity data of the first stage after separation. This communication computer must be designed to send data to the ground station.

3.2.9.35.7. The trigger signal for stage separation must be generated by first stage avionics systems.

3.2.9.35.8. Communication between the first stage avionics and the second stage avionics must be wired (interstage communication shall not be through wireless methods).

3.2.9.35.9. In order for the stage separation to be detected by the first stage avionic system, the necessary sensor(s) must be included in the system.

3.2.9.36. The structural requirements for stage separation are presented below:

3.2.9.36.1. After launch, the rocket and the section in which the Stage Separation System is located on the rocket will be designed and manufactured to be resistant to the loads (forces and moments) to which it will be exposed during flight, with strength-based analyses presented in the relevant design reports (PDR, CDR).

4. CRITERIA AND EXPECTATIONS

4.1. COMMON REQUIREMENTS RELATED TO REPORT CONTENTS

4.1.1. It is forbidden to copy the current or past reports of other teams, or to engage in collaborative studies/testing/analyses with them when preparing reports. Should such acts be detected (even if the competition has been concluded), the teams in question will be disqualified. This prohibition stands even if the teams provide references to each other's reports and studies.

4.1.2. Teams are expected to provide references to the original sources of any tables, images, equations and similar content that they did not produce in the report content. When content in violation of this rule is detected, the team will be deemed to have plagiarised and will be disqualified from the competition.

4.1.3. Teams are required to use the APA (American Psychological Association) reference style for the content they will reference. (The necessary information about the reference style in the document can be obtained using "American Psychological Association. (2020). *Publication manual of the American Psychological Association (7th ed.).")*

4.1.4. At the time of delivery of the relevant reports (PDR and CDR), a checklist will be filled in by the teams and submitted to the Competition Committee along with the report. A sample checklist is presented in Annex-1.

4.1.5. Examples of the disqualification criteria for the reports (*criteria applied in previous years*) are presented in **Table 2** and **Table 3**, and the disqualification criteria in place are updated throughout the competition (*The most accurate disqualification criteria will be included in the current report template of the relevant design reports*):

1.	Diameter variations in the body tube in the design of the competition rocket (except for the Boat-tail)
2.	A competitors' design using a different engine to the one to be provided by the Competition Committee
3.	Lack of compliance between the task profile specified in the report and the specification.
4.	No payload separation at the apogee
5.	Failure of the drogue parachute to open at apogee *
6.	Failure of the Main parachute to open at an altitude of 400–600 meters *
7.	Presence of active control systems on the rocket in the design
8.	Payload mass being less than the value specified in the specification
9.	Payload does not meet the requirements specified in the specification
10.	Lack of GPS in one or more pieces to be recovered separately and/or GPS not specified in the desired location in the report
11.	Integration body tubes and nose cone shoulder not conforming to specification
12.	Lack of a geolocation system in the flight computer, and/or the data cannot be transmitted to the ground station
13.	No trade-off analysis made for the engine connection, and/or the design is not made in such a way that the engine can be installed last
14.	Parachute descent speeds not in accordance with the values given in the specification
15.	Static margin value at Mach 0.3 is not within the specified range
	** The High School category is exempt from these criteria, as only a single parachute is used. The single parachute is to be opened at the apogee.*

Table 2. Preliminary Design Report General Disqualification Criteria

High School Category Specific Disqualification Reasons	Failure to Meet Avionic System Requirements
	Flight speed greater than Mach 1
Medium-Altitude Category Specific Disqualification Reasons	Flight speed greater than Mach 1
	Failure to meet avionics system requirements
High-Altitude Category Specific Disqualification Reasons	Not using authentic products in avionic systems
	No backup avionics system
Challenging Category Specific Disqualification Reasons	Flight speed greater than Mach 1
	Failure to meet avionics system requirements

Table 3. Category Specific Disqualification Criteria

4.1.6. Each reporting stage inherits the disqualification criteria of the previous stage.

4.2. PRELIMINARY DESIGN REPORT (PDR)

4.2.1. The teams are responsible for demonstrating and proving in their Preliminary Design Reports (PDR) that their designs meet all the technical requirements.

4.2.2. To prove that the technical requirements are met, a *Compliance Matrix* shall be created and presented separately in the Annex to the relevant design reports.

4.2.3. The optimization of all requirements to allow the fulfilment of the objective function (reaching the target altitude) must be carried out at the system and subsystem level through optimization choices for the design criteria, material and production, subject to comparison/benchmarking, and trade-off analyses must be shared.

4.2.4. The teams are responsible for having completed a trade-off analysis for the systems they plan to use, listing the criteria that influenced their decision *(indispensable and optional criteria),* with the justification for their decisions presented in the PDR.

4.2.5. All elements of the design shall be described, including the architectural components and interfaces.

4.2.6. The results of the Failure Modes and Effects Analysis shall also be presented in the PDR (*Template documents will be shared on the TEKNOFEST website so that the teams can carry out the Error Mode and Effects Analysis*).

4.2.7. The teams are required to present the PDR with the general CAD design of the rocket they plan to produce, explaining their systems and design in a detailed manner.

4.2.8. The material selection criteria and the compatibility of these selections with the system are also expected to be included in the report.

4.2.9. A preliminary analysis (effects such as pressure, temperature, etc.) that will constitute the basis for the hot gas generator to be provided to the teams by the TEKNOFEST Competition Committee must be submitted in the PDR.

4.2.10. The teams are required to submit the PDR before the date specified on the competition calendar.

4.2.11. Open Rocket files with an ".ork" extension supporting the report must be submitted with the report.

4.2.12. The PDR template may be accessed via the website.

4.2.13. The teams must provide all the required information in the PDR, in full, and in the relevant sections. Information included other than in the relevant section of the report will not be evaluated.

4.2.14. Unsolicited information in the report will not be evaluated.

4.2.15. The information, analyses and evaluations requested by the TEKNOFEST Rocket Competition Committee for inclusion in the PDR should be presented in the report in accordance with English grammar rules, and in a manner that can be easily understood and followed. For the teams that fail in this regard, a maximum of 20% (twenty percent) points may be deducted for the relevant section of the report, as necessary.

4.2.16. In the Pre-Design phase, the teams shall be subjected to preliminary selection (taking into account the PDR). Teams that pass the Preliminary Design phase successfully shall move on to the Critical Design phase.

4.2.17. "Entry Criteria" have been established by the TEKNOFEST Rocket Competition Committee for the effective and efficient evaluation of the PDR submitted by the teams. The outputs that the teams are expected to provide in the PDR must meet the Entry Criteria. Failure in this regard will result in the PDR not being evaluated in any way. Provided that the "Entry Criteria" are met, the referees shall carry out their evaluation taking into consideration the PDR "Exit Criteria". The Entry and Exit Criteria shall be announced together with the templates of the design reports.

4.2.18. Reasons for the disqualification of teams from each category in the PDR are stated in **Table 2**.

4.2.19. Reasons for disqualification in the category-specific PDR are stated in **Table 3**.

4.3. CRITICAL DESIGN REPORT (CDR)

4.3.1. The teams are responsible for carrying out and providing the results of all the necessary analyses and tests in the Critical Design Report (CDR), demonstrating that their designs are ready to proceed to the final production, integration and testing phases.

4.3.2. All proof that the rocket designed by the teams fully meets the vehicle requirements and performance criteria provided in the specification shall be submitted to the Competition Committee in full.

4.3.3. Regarding the Failure Mode and Effects Analysis, the initial version of this analysis should be presented in the PDR and this analysis should be finalized by the teams throughout the rocket design process (*All structural, fluid dynamics, flight algorithm adequacy, etc. analyses related to the designed rocket must have been completed. Thus, the selected materials, production methods, flight resistance of the rocket and its components and the suitability of the flight algorithm must have been proven).*

4.3.4. Simulation processes are iterative, and the stages of rocket design must be explained in the CDR with cause-effect relationships.

4.3.5. Integration videos of the Detailed Computer Aided Designs *(CAD)* must be prepared using the applied CAD program. All details, written or otherwise in the report, must be demonstrated and explained in the CAD

design.

4.3.6. The system should be explained with an integration scheme (i.e. assembly details of the systems must be presented with supporting visuals from the CAD program, answering such questions as "*How the stages are connected to each other, in the Challenging Task category",* "*How the nose cone is connected to the* body tube", "*How the parachute is connected to the body tube"*, "*How the motor is fixed inside the body tube in such a way that it can be removed").*

4.3.7. Details of the production place, and the design and material of all systems, such as the body tube, nose cone, electronic card, etc. must be provided.

4.3.8. Time, production and test plans must be prepared *(Detailed information should be included in the content of the plans, such as the production weeks and the dates on which the components will be tested).*

4.3.9. It is necessary to prove that the design is producible, and to submit analysis/test results to the TEKNOFEST Rocket Competition Committee.

4.3.10. Each criterion and design detail specified in the CDR shall be evaluated for each system/subsystem/component in the competition, and the Competition Committee shall provide feedback accordingly.

4.3.11. The final analyses (pressure, temperature, etc. expectations), which will be the basis for the hot gas generator to be provided to the teams by the TEKNOFEST Competition Committee must be presented at CDR.

4.3.12. Open Rocket files with an ".ork" extension supporting the report must be submitted with the report.

4.3.13. The teams are expected to present all the information required in the CDR in the relevant sections. Information provided in unrelated sections of the report shall not be taken into consideration.

4.3.14. The teams that qualify for the final and that receive financial support based on the CDR evaluation results shall be announced on the date specified on the Competition Calendar.

4.3.15. The information, analyses and evaluations requested by the TEKNOFEST Rocket Competition Committee to be included in CDR should be presented in the report in accordance with Turkish grammar rules, and in a manner that can be easily understood and followed. For the teams that fail in this regard, a maximum of 20% (twenty percent) points
may be deducted for the relevant section of the report, as necessary.

4.3.16. "Entry Criteria" have been set by the TEKNOFEST Rocket Competition Committee for the effective and efficient evaluation of the CDRs submitted by the teams. The outputs that teams are expected to provide in the CDR must meet the Entry Criteria. Failure in this regard will result in the CDR not being evaluated in any way. If the "Entry Criteria" are met, the referees shall carry out their evaluation taking into consideration the CDR "Exit Criteria". The Entry and Exit Criteria shall be announced together with the templates of the design reports.

4.3.17. All electronic components on the system powered by batteries shall be specified in the CDR, which should include switching circuit schematics.

4.3.18. Additional requirements for the High-Altitude and Challenging Task categories are as follows:

- Aside from the CDR, a data set of the design reports and technical drawings of each subsystem shall be submitted.
- Technical drawings describing/demonstrating the integration of the rocket must also be submitted.
- The materials and integration strategies applied in the drawing set must be easily understandable.
- Integration instructions must be prepared.
- The design details, strengths, thermal and flow analyses, etc. in the sub-system design report must be presented in detail *(e.g., a flow analysis must be included with the relevant solution network details, limit conditions, convergence details and fluid properties, and an interpretation of the results).* Similarly, details must be provided for all other analyses.
- The TEKNOFEST Rocket Competition Committee may request additional information/documents, in addition to those stated above.

4.3.19. The reasons for disqualification of teams in CDR are stated in ***Table 4***.

1.	In the final design, the rocket has not been designed to allow the engine to be integrated/mounted last or removed as needed
2.	Requested prototype test videos not delivered
3.	Presence of parts that protrude into the rocket cross-section and disrupt the structural/aerodynamic integrity (necessary elements such as sensors, antennas, cameras will be allowed)
4.	The rocket is not designed to be activated on the rail (the flight computer and payload cannot be turned on)
5.	*Failure to provide mandatory structural and aerodynamic analyses for the Challenging and High-Altitude categories is grounds for disqualification.

Table 4. *Critical Design Report General Disqualification Criteria*

4.4. LAUNCH READINESS REPORT (LRR)

4.4.1. The results of all the preliminary analyses, simulations and tests performed by the teams to ensure the successful launch of the rockets they have designed and produced must be presented in the Launch Readiness Report (LRR).

4.4.2. The LRR must include a list of the distribution of tasks within the team, and the security measures to be followed in the integration area, together with a list of the integrations and checks to be made on the launch rail.

4.4.3. In general terms, 100% of system design and production is expected to be completed.

4.4.4. It is also necessary to prove in this report that the rocket, after integration has been completed, can be made ready for launch within 10 (ten) minutes, and that the recovery system is working, with a video recording.

4.4.5. It must also be proven that the produced rocket can achieve the velocity stated in the PDR and CDR when leaving the rail by simulating the rocket with the total mass one more time (*using Open Rocket and simulation and modelling software with three degrees of freedom developed by the teams, aside from those in the high-school category*), and the related simulation data should be included in the LRR report. *(The simulated Open Rocket file shall be submitted with the LRR)*

4.4.6. The criteria for disqualification in the LRR are listed below:

4.4.6.1 Inadequacy and/or incompleteness of at least one of the required tests

4.4.6.2 Lack of images showing the final assembly of the entire rocket.

4.5. POST-LAUNCH EVALUATION REPORT (PLER)

4.5.1. The teams must analyse the basic information related to the engine, payload, vehicle dimensions, etc. of their rockets, along with the flight information (*reached altitude, actual flight trajectory, etc.*) related to the launch.

4.5.2. The teams shall compare the simulation values for the relevant variables (*velocity, position, etc.*) with the actual flight data in the Post-Launch Evaluation Report (PLER), and detail the comparison with charts.

4.5.3. After the rocket has descended to the ground, the teams must upload the velocity and position values obtained through telemetry *(using the format requested in the Launch Readiness Report)* to the external drive to be distributed in the field, and deliver it to the responsible referee within five (5) minutes.

4.5.4. The report must provide sensor data and an analysis of the success level of the recovery process.

4.5.5. Lessons learned at the end of the process must be included in the report.

4.5.6. The PLER must be submitted to the TEKNOFEST Rocket Competition Committee e-mail address by 08:00, two days after the launch, at the latest.

4.5.7. Teams that fail to deliver their reports within the said period shall be considered as having not completed the task (they shall not be disqualified, but will not be evaluated for this part).

4.6. FLIGHT SIMULATION REPORT

4.6.1. A Flight Simulation Report is requested from the competitors who will compete in the Medium-Altitude, High-Altitude and Challenging Task categories. Teams in the High School category will not prepare a Flight Simulation Report.

4.6.2. Flight Simulation Reports will be sent “two” (2) times simultaneously with these reports, apart from the

PDR and CDR reports.

4.6.3. Flight Simulation Reports are not a qualifying criterion for the Medium-Altitude category, although they are scored.

4.6.4. For the High-Altitude category, the team will be disqualified if a minimum score of 70% is not attained in the first submission (simultaneous with the PDR). In the second submission (simultaneous with CDR), if a minimum of 50% points is not achieved, the team is disqualified.

4.6.5. If a minimum of 70% is not achieved in both submissions (simultaneous with PDR and CDR) in the Challenging Task category, the team will be disqualified.

4.6.6. For each category, Flight Simulation Report templates will be shared.

5. EVALUATION PRINCIPLES OF THE COMPETITION

5.1. OVERALL SCORE

At the end of the competition, an evaluation shall be made out of 1,000 (one thousand) points. The breakdown of the overall score will be as stated in **Table *5***.

	High-School Category	**Medium-Altitude Category**	**High-Altitude Category**	**Challenging Task Category**
Preliminary Design Report (PDR)	100	40	40	40
Flight Simulation Report (PDR Level)	-	10	10	10
Critical Design Report (CDR)	150	150	150	150
Flight Simulation Report (CDR Level)	-	50	50	50
Launch Readiness Report (LRR)	50	50	50	50
Post-Launch Evaluation Report (PLER)	100	100	100	100
Competition Area Rating	200	200	200	200
Altitude Rating	250	250	250	250
Recovery Rating	150	150	150	150
Total	**1000**	**1000**	**1000**	**1000**

Table 5. Scoring Breakdown

5.2. REPORTING

In the evaluation section of the competition, the teams shall be expected to present reports on the status of their designs. These reports are:

- Preliminary Design Report (PDR)
- Critical Design Report (CDR)
- Launch Readiness Report (LRR)
- Post-Launch Evaluation Report (PLER)
- Flight Simulation Reports (*Except High School category*)

5.3. EVALUATION IN THE INTEGRATION AREA

5.3.1. The teams shall be evaluated in four (4) different areas, namely “Payload and Recovery”, “Avionics”, “Structural Integrity” and “Aerodynamics”, in the integration area. After this evaluation, they shall be identified as suitable for launch with a “Green Label” in each related area. Teams that fail to obtain all of the labels will not be allowed to launch. Details on the scope of the labels that will be given to the teams on the integration day are given in ANNEX1. It is included in the competition area scoring ***Table 6***.

REFEREE ASSESSMENT ON THE COMPETITION AREA	SCORE
• Payload and Recovery	50
• Avionics	50
• Structural Integrity	50
• Aerodynamics	50
TOTAL	**200**

Table 6. *Competition Area Rating*

5.3.2. Teams that cannot collect all the required labels as a result of the activities in the integration/assembly area, but whose flight is cleared for safety, are granted the right to "Non-Competition Flight".

5.3.3. Teams must obtain the Aerodynamic and Structural Integrity labels as a minimum in order to fly out of competition.

5.3.4. Although failure to obtain an Avionics label is not necessarily an obstacle to non-competition flight, the decision to be made regarding the effect of the avionics system on non-competition flight is at the discretion of avionics referees present in the integration area. Teams that are to fly out of competition must comply fully with the directives of the avionics judges.

5.3.5. Failure of teams to obtain Payload and Recovery System labels does not prevent them from flying out of competition. However, the decision regarding the effects of the teams' recovery systems and their payloads on non-competition flights is at the discretion of the Recovery System referees in the integration area. If teams are to fly out of competition, they must fully comply with the instructions of the recovery system referees.

5.3.6. Teams are required to submit a petition to the referee committee before the scheduled time to complete the labels in order to fly out of competition.

5.3.7. By submitting a petition, the teams accept that they will not be subject to scoring and will not be included in the ranking, even if they successfully complete the tasks given in the specification, in the event of them flying out of the competition.

5.3.8. After the petitioning teams have been cleared for non-competition flight, the Integration Area Judges have the authority to not allow a given team to fly if any unsafe condition for flight is found.

5.4. MISSION ASSESSMENT

5.4.1. Flight performance will be scored out of four hundred (400) points in total in the Medium-Altitude, High-Altitude and Challenging Task categories. The rocket's exact trajectory of the target apogee altitude with an accuracy of ±20% will account for 62.5% of this score (250 points). A maximum score of 400 in flight performance can be obtained through the additional 150 points being given in the event of the rocket being successfully recovered.

5.4.2. In the High School category, flight performance will be scored out of five hundred (500) points in total. The rocket's exact trajectory of the target apogee altitude with an accuracy of ±20% will account for 60% of this score (300 points). The maximum score of 500 in flight performance can be obtained through the additional 200 points being given in the event of the rocket being successfully recovered.

5.4.3. Precise trajectory planning is essential. Scores shall be calculated from the values recorded on the relevant altimeter device using the formula below, with a tolerance of ±20% in the target altitudes of 20,000 feet, 10,000 feet and 5,000 feet.

$$Score = (Maximum\ Score) - (Maximum\ Score) * \frac{|Target\ Altitude - Actual\ Altitude\ |}{Tolerance\ (feet)}$$

5.4.4. In the challenging altitude category, teams will be evaluated based on the target altitude they have

determined in the CDR.

5.4.5. Devices other than the altimeter provided by the Competition Committee shall not be used for the calculation of the scores.

5.4.6. Below is an example of the flight score calculation of a team that reached an altitude of 9,500 feet in the Medium-Altitude Category.

$$Score = 250 - 250 * \frac{|10000 - 9500|}{2000} = 187.5\ Score$$

5.4.7. For the recovery operation to be considered successful, the rocket must be reusable, requiring only the replacement of the engine. The referees responsible for the assessment shall visually inspect and evaluate the recovered rocket after it has been returned to the designated inspection area.

6. AWARDS

6.1. AWARDS FOR EACH CATEGORY

The awards to be given to the successful teams are presented in the below table. No awards shall be made to individuals. All the awards shall be equally divided among all team members, and deposited into the bank accounts specified by each team member.

CATEGORY	FIRST PRIZE	SECOND PRIZE	THIRD PRIZE
HIGH SCHOOL	70,000 TRY	60,000 TRY	50,000 TRY
MEDIUM-ALTITUDE			
HIGH-ALTITUDE	100,000 TRY	80,000 TRY	60,000 TRY
CHALLENGING TASK			

Table 7. *Competition Awards*

Within the scope of the competition, special awards will be given for "Best Team Spirit", "Scientific Payload" and "Best Design" topics.

Best Team Spirit Award: The award is to be given to the teams that aim to finalize the tasks undertaken in the competition area and the work plans in the area in the best way, and to teams that reflect their energies in the best way, regardless of whether they achieve success in the competition. Assessments related to this award will be made on the basis of teamwork in field, efforts, competence, and intra- and inter-team communication demonstrated in the field. This award is for prestige and has no monetary value.

Scientific Payload: The Scientific Payload award will be granted to teams whose duty is not mandatory (*all categories except Medium-Altitude Category*). This award is for prestige and has no monetary value.

Best Design Award: Aside from in the reporting stages, the Competition Evaluation Board also makes design evaluations. The Competition Evaluation Committee will determine the teams with the best designs, decided upon based on a vote. It will take into account the level of compliance with the design conditions, the originality of the design and evaluation criteria according to the scope of the competition and for all subsystems of the rocket. This award is for prestige and has no monetary value.

6.2. MINIMUM SUCCESS CRITERIA FOR ELIGIBILITY

6.2.1. Teams are divided into three based on their flight and mission achievements: Fully Successful, Partially Successful, and Unsuccessful. Teams failing to meet any of the following requirements will be considered unsuccessful.

- The rocket, having received launch approval from the referee committee, is launched and leaves the ramp without any problems,
- The rocket has reached at least 80% of the targeted altitude in its category,
- Successful separation of the Payload from the rocket,

- In the Challenging Task category, the successful operation of the stage-separation system,
- In the Challenging Task category, the generation of the ignition signal by the avionics in the second stage; the reception of the ignition signal by the EOU after deciding that the stage is in a safe condition, considering the positional vectors of the second stage; and the successful transmission of the signal from the main avionic system to the ground station,
- The Payload and the rocket (body tube and nose cone together) have landed safely by parachute *(the parts descending to the ground must be reusable),*
- Recovering the Payload and all the sub parts of the rocket from the coordinates transmitted to the team's ground station,
- The referee altimeter from the recovered rocket is delivered to the referee committee in good condition.

6.2.2. Reading the altitude data from the referee's altimeter without the need for any additional intervention. Teams will be considered *Partially Successful* in the event of the fulfilment of above criteria for successful mission, but:

- If at least one or all of the parachutes deploy at the wrong time, even if no parachute has been deployed before the apogee.
- The deployed parachutes become entangled,
- A single stage of a double-stage parachute is deployed, leading to a landing with a single parachute (*this does not apply to the High School Category*),
- The payload, after separating from rocket body tube, becomes entangled with the rocket parachute and lands together with the rocket body tube.

6.2.3. Teams that perform a partially successful task will receive 75 penalty points for not fully completing the specified task.

6.2.4. Successful Flight/Mission and Partially Successful Flight/Mission teams are eligible for an award ranking.

6.2.5. Teams performing Partially Successful Flights/Missions will not receive first prize, even if they are first in the points ranking at the end of the competition. In such a case, the team will be awarded second place at best.

7. CODE OF CONDUCT AND OTHER RULES

7.1. CODES OF CONDUCT

7.1.1. Persons exhibiting/using any behaviours, actions, verbal expressions, etc. that are in contravention of social ethics in the festival area, or during the competition (reporting stages, evaluation process, etc.) shall be disqualified from the competition; immediate legal action related to the matter may be taken; and such persons shall be denied participation in any kind of organization or activity hosted by the Turkish Technology Team Foundation for at least two (2) years.

7.1.2. Regarding the discourse and style used/to be used in all contacts and communications established with the TEKNOFEST Rocket Competition Committee:

- Impolite and inappropriate expressions and behaviours must be avoided;
- Insults, threats and bad language must be avoided;
- Targeting or insulting officials or competition team members through such social media as Facebook, Skype, Messenger, WhatsApp, Twitter, etc. must be avoided; and
- Attention must be paid to spelling rules and style in all petitions and objections.

7.1.3. Behaviours, acts, discourse, etc. that negatively affects the operation and motivation of other teams in the festival area are forbidden.

7.1.4. Social peace should be upheld in and around the dormitory in which accommodation is provided. Legal action shall be taken against person(s) failing in this regard.

7.1.5. It is the responsibility of the team to back up/store the equipment and materials to be used in the design and production processes, taking into account any eventualities, and to replace the parts when necessary, as it is

prohibited to procure/borrow items from another team.

7.1.6. During the competition, it is forbidden to copy the reports of previous years or the current teams, or to engage in any collaborative designs, tests or analyses with other teams. If detected, this shall be considered grounds for disqualification.

7.1.7. It is mandatory to behave objectively and in accordance with the requirements of the competition while in the competition area, without discrimination against language, religion, philosophical belief, political opinion, race, age or gender, and avoiding any behaviour or practices that hinder equal opportunities.

7.1.8. The goods/resources provided by a company/institution/organization contributing to the competition to be used in the activities must be used exclusively in line with their purpose and service requirements, and the said goods/resources should not be wasted. Wastefulness and extravagancy in buildings, vehicles and other public goods/resources must be avoided throughout the competition. It is of vital importance to behave effectively, efficiently and economically when using public goods, resources, workforces and facilities.

7.1.9. It is important to support activities that facilitate the conducting of the competition, to meet the needs in the most effective, fast and efficient way, to increase service quality and to ensure satisfaction throughout the course of the competition.

7.1.10. Competition area officials must abstain from behaviours that negatively affect, or that appear to affect, the conducting of their duties in an impartial and objective manner; and no request can be made that may benefit themselves/their relatives/friends or person(s) or organizations to which they are related. Legal action shall be taken against person(s) failing in this regard.

7.1.11. Team members will be held accountable for their responsibilities and liabilities, and must be open to transparent corporate evaluation and auditing; managers must take the necessary precautions to prevent corruption, as well as any actions and procedures that are in contravention with the objectives and policies of their institutions. They shall also train their staff in the principles of ethical behaviour, shall ensure their compliance with these principles and shall provide guidance in ethical behaviours.

7.1.12. While carrying out their tasks, team members must not make any statements, commitments, promises or suggestions that are binding on the institutions for which they work, and shall avoid making deceptive and false statements.

7.2. OTHER RULES

7.2.1. Each team retains the right to object to a referee through its designated member. Objections must be in writing, and must include the signatures of the team captain and team advisor.

7.2.2. The objection(s) should be presented to Competition Committee within two (2) days after the announcement of the competition results. Any objections declared after time limit will not be evaluated.

7.2.3. Objections are examined by the referee committee and are resolved within 72 (seventy-two) hours.

7.2.4. After the evaluation results are announced, the authorized persons from each team shall submit their objections and justifications in writing. Objections are received on www.t3kys.com.

7.2.5. Teams shall not publicize their objections via social media in any way. Failure in this regard will result in their disqualification from the competition.

7.2.6. The subject of the competition is the outcome of the efforts of the competitor/competitors on the team, the intellectual works are a reflection of the characteristics of the team members, and the Advisor will not be accepted as the owner of the work.

7.2.7. Teams that have made use of reports from previous years found on our Website in their own reports must provide citations on the relevant page. You must provide an explanation after the cited phrase. QUOTATION FORMAT: "Cited Phrase(s)" (Year, Competition Name, Category, Team Name) SAMPLE SUMMARY: " The fact that the earthquake victim's whereabouts is not detected in the debris is the main problem slowing down debris removal and hindering the search for earthquake victims" (2020, Technology Contest for the Benefit of Humanity, Disaster Management, Team X)

7.2.8. The TEKNOFEST Rocket Competition Committee reserves the right to cancel the competition in the event of there being an insufficient number of applications with the necessary technical knowledge and skills required for participation following the evaluations made as part of the application process.

7.2.9. Applications are to be made online via the application system on www.t3kys.com until 28.02.2022.

7.2.10. The team captain makes the registration on the system during the application period, and is to ensure the full and correct registration of the advisor and team captain/members, in addition to sending them invites by e-mail. The invited member logs into the Application system to accept the invite, found in the "Team information" section, and the registration is duly completed. Otherwise, the registration will be incomplete.

7.2.11. All necessary processes throughout the competition (Report Reception, Report Results, Financial Assistance Application, Objection Processes etc.) are carried out through the KYS portal. Teams should keep track of their processes via the KYS portal.

7.2.12. The competitors accept and undertake to participate in all kinds of written or visual promotions, publications, social media and Internet broadcasts related to the competition, whether made before or after the competition, by the T3 Foundation and/or TEKNOFEST. Furthermore the competitor accepts, declares and undertakes that they assign the rights of processing, dissemination, duplication, representation and presentation to the public through audio or visual media, over the designs, codes, and scientific and artistic works to which they have contributed in terms of production without any limitations on time; and that they consent to the use and development by the relevant persons, provided that reference is made, and sharing with the public in accordance with the open source policy of the T3 Foundation of the relevant work. The T3 Foundation reserves the right to make changes to the work when necessary and to make all intellectual property available to the public (limited to what it shares with the T3 Foundation), as and when it deems appropriate.

7.2.13. The competitor agrees and undertakes that within the framework of Industrial Property Law No. 6769 and other legislation regulating Intellectual Property Rights, they may apply for registration or protection under the written permission of the T3 Foundation at the Turkish Patent and Brand Institution or the WIPO (World Intellectual Property Organization) regarding the rights of the part transferred from the work to the T3 Foundation, that they will not obstruct its use by seeking any legal remedy against third parties who take advantage of the open source code policy with the knowledge of the T3 Foundation and against the T3 Foundation, that they will not resort to protective measures within the framework of legislation, and that they will not file for the suspension of use with claims of violation.

7.2.14. In the event of a competitor(s) violating the intellectual and industrial property rights of any product, the damages incurred by the TEKNOFEST Rocket Competition shall be compensated by the relevant team (including its advisor).

8. ANSWERS TO FREQUENTLY ASKED QUESTIONS

The answers given by the Competition Committee to frequently asked questions (FAQ) by the teams can be found on the relevant competition page on teknofest.org.

9. COMPETITION CALENDAR

The 2022 TEKNOFEST Rocket Competition calendar is as presented in ***Table 8***.

TEKNOFEST ROCKET COMPETITION 2022 CALENDAR	
DATE	**ACTIVITY**
31 January, 2022	Deadline for the Application to the Competition
01 February, 2022	Deadline for the Release of the Preliminary Design Report (PDR)
25 February, 2022	Announcement of Preliminary Design Report (PDR) Results
01 April, 2022	Deadline for the Release of the Critical Design Report (CDR)
11–12 April, 2022	Q&A Meetings
17 April, 2022	Deadline for the Release of Test Videos
29 April, 2022	The Announcement of the Teams Eligible for Financial Support Finalist Teams Based on CDR Scores
10 May, 2022	Receiving of Bank Account Information from the Teams that are Eligible to Receive Financial Support
15 May, 2022	Payment Date for the Financial Support
15 June, 2022	Deadline for the Release of the Launch Readiness Report (LRR)
25 June, 2022	Deadline for the Release of LRR Videos
10 July, 2022	Announcement of the Teams Qualified for Launch Campaign
15 July, 2022	Announcement of Transportation, Accommodation and Launch Schedule Information
01–10 August, 2022	Competition Dates

Table 8. *Competition Calendar*