ENGINEERS AUSTRALIA

WARMAN®
Design & Build Competition

38th Warman Design and Build Competition

Competition rules

Mining technology for a sustainable future

38th WARMAN
DESIGN & BUILD COMPETITION
2025

Project SEESAW

(Sustainable Engineering for Energy Supply in Advancing Worlds)

CONTEXT

Gondwana is an island on a planet orbiting a star on the outer fringes of the Milky Way. The Gondwanans have nearly exhausted their natural fuels and desperately need a sustainable alternative. Inhabitants, including plant and wildlife, will freeze in winter or overheat in summer if another option is not discovered. Depletion of the non-sustainable fuel is imminent.

Meteorites, containing rare minerals useful for sustainable energy supply, have recently landed in random locations on the island. Three meteorites of various size and weight have been identified for immediate use but due to the rapidly rising atmospheric temperature they must be autonomously collected and deposited in a fuel bunker on the other side of an unstable bridge. The high temperature environment means that this process must be completed quickly.

The Gondwanans have once again asked for assistance from Earth's student engineers to design a system to collect and deposit the meteorites into a storage bunker. A scaled down prototype of their design will be manufactured and demonstrated.

Your team of student engineers has been set the task of designing and building a reduced scale, demonstration system which is capable of collecting three model meteorites and safely depositing them into the storage bunker. Over the last 37 years, Earth's engineering students have rendered invaluable assistance with such engineering problems, and we anticipate you will again be successful on this thirty-eighth occasion.

OBJECTIVE

Prototype a reduced scale, proof-of-concept transport system, later referred to as the "system", which will precisely deliver scale representations of the meteorites, from their respective settling zones to the storage bunker. Referring to Figure 1, the autonomous system will start from a safe area defined by the Start Zone. The meteorites will be simulated using a tennis ball, a racquetball and a table tennis ball (hence forth referred to as "balls") which will be randomly distributed in a 3 x 3 grid. The system must traverse narrow gaps and potentially unstable terrain which is simulated by a pivoting plane or seesaw. Size constraints require your system to fit within an imaginary 400 mm sided cube. When activated via a single starting action, your system will autonomously collect the balls, negotiate the seesaw, or narrow gaps and deliver them to the storage bunker, shown as the ball deposit zone. The maximum allowed time for the operation is 120 seconds.

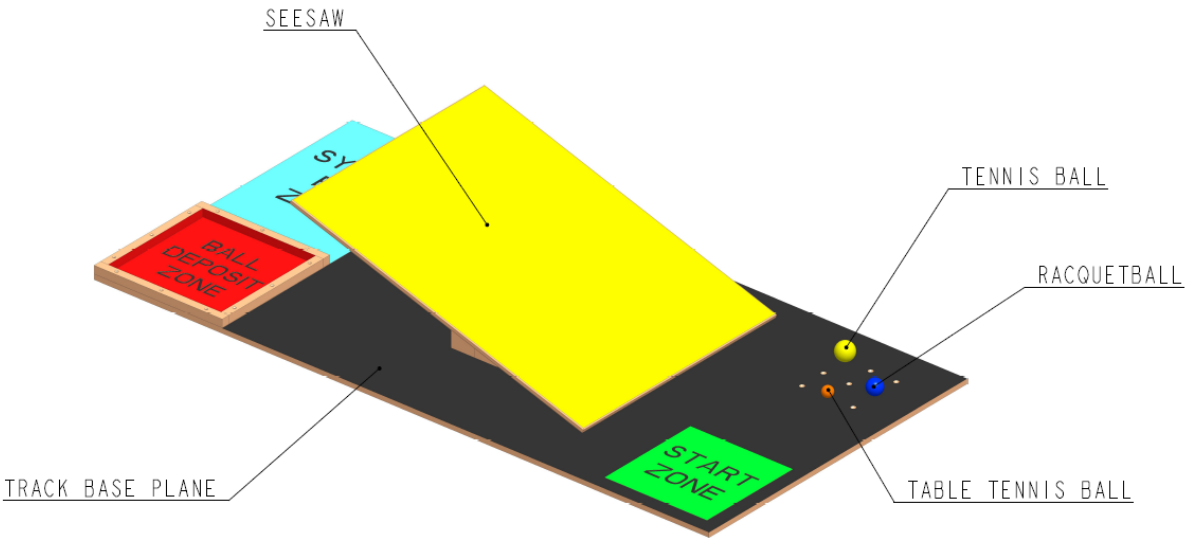

Figure 1. Schematic view of the 2025 Competition Track showing the track base plane, SEESAW, ball deposit zone and system end zone.

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Details follow:

- Competition Guidelines
- Competition Rules
- Frequently Asked Questions
- Further Competition Details
- Spirit of the Competition
- Appendix A – Detailed Drawings of the Competition Track and Relevant Component Details

Document Control:

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Competition Guidelines

Wording: *The language of the guidelines is tiered. Those clauses expressed as "SHALL" are mandatory and failure to comply will attract penalties which in the extreme could lead to a zero RUNscore or disqualification at the International Final. Those expressed as "SHOULD" or "MAY" reflect some level of discretion and choice.*

ELIGIBILITY

G 1. Teams that are eligible to represent their campus in the International Final SHALL consist of students enrolled in the competition year in their first engineering design course/subject/unit in an Australasian (or other countries, by arrangement) mechanical or mechatronics-based BE or 3+2 ME programme. Teams SHALL consist of at least two students, with teams of four strongly recommended, but it is recognised that larger teams MAY be educationally appropriate at some universities. If an alternative team structure is envisaged, an International Competition Coordinator should be consulted to ensure that other teams are not unreasonably disadvantaged. While students may be required to participate in the Warman competition more than once at their campus level, students SHALL NOT compete at the International Final more than once.

In registering a team, the Campus Organiser attests to the eligibility of the team and teams found to be ineligible at the International Final SHALL NOT be eligible for an award.

SAFETY

G 2. Safety is of paramount importance when participating in this competition. All engineers SHOULD know that injury and damage to equipment and the environment occur when the control of energy (in any form - whether strain, potential, kinetic or thermal) in a system is lost.

G 3. As appropriate, protective clothing, enclosed footwear, safety glasses or full-face masks SHOULD be worn by students working on systems during construction, testing, and competitions. Refer to your campus requirements. Appropriate, protective clothing, enclosed footwear, safety glasses or full-face masks SHALL be worn at the International Final.

G 4. Students are encouraged to carry out a risk assessment for their system prior to campus testing. Students are encouraged to embrace risk management in their own activities and MAY need to demonstrate the safe operation and produce risk assessment documentation in order to compete in either the campus heats or at the International Final.

G 5. Appropriate fuses SHALL be used for electrical systems.

G 6. Compressed gas systems MAY be used, but if used, students SHALL gain Campus Organiser approval based on a safety assessment.

Such systems presented at the International Final SHALL be examined against the following principles and in order to run SHALL be found to be acceptable to the International Competition Coordinators.

- *Home fabricated pressure system components SHALL NOT be used.*
- *Commercial components SHALL be used (unions, vessels, cylinders, lines, etc).*
- *Evidence of proof testing of compressed gas systems SHALL be provided.*

To avoid disappointment, students using compressed gas MAY consult with the International Competition Coordinators prior to arrival at the International Final. The International Competition Coordinators' approval decision SHALL be final after examination of the presented system and documentation at the International Final.

G 7. Systems that are deemed by the officials and judges to be hazardous SHALL NOT be permitted to run. For example, employing any form of combustion SHALL be considered hazardous.

COMPETITION TRACK, EQUIPMENT, AND ENVIRONMENT

G 8. The track will be fabricated using primarily one sheet of F14 Formply, with nominal dimensions 2400 x 1200 x 17 mm, arranged as shown in Figure 1 and Appendix A (Drawings). A supporting frame below this sheet, not shown, MAY be fabricated by any convenient method. The supporting frame SHALL NOT extend beyond the perimeter of the competition track.

NOTE: *Formply sheets as supplied may be slightly larger than the nominal 2400 x 1200 mm dimensions and are generally 2420 x 1210 mm. Competition Tracks at the International Final SHALL be trimmed to be 2400 x 1200 mm sheets.*

G 9. The pivoting SEESAW SHALL be made from Medium Density Fibreboard (MDF) or equivalent sheet material (MDF will be used at the International Final), with nominal dimensions 900 x 1200 x 18 mm, arranged as shown in Figure 1 (central yellow portion) and Appendix A (Drawings). The SEESAW SHALL preferentially tilt to the side shown in Figure 1. To provide teams with sufficient grip, the upper surface and external edge surfaces of the SEESAW SHALL be coated using Dy-Mark 1L Yellow TreadRite. It is recommended that the coating is initially applied using a paint brush and then rolled whilst still wet using a UNi-PRO 160 mm Jumbo Roller Microfiber. This ensures an even distribution of the coating to the top surface.

G 10. The SEESAW SHALL be stiffened using 30 x 30 x 3 mm Mild Steel Angle on the underside of the pivoting board (opposite to painted side), refer Appendix A (Drawings).

G 11. The pivot support for the SEESAW SHALL be made using 90 x 45 mm DAR or equivalent stock material and 30 x 30 x 3 mm Mild Steel Angle, refer to Appendix A (Drawings) for manufacturing and assembly instructions. To prevent the SEESAW from drifting laterally, square washers SHALL be used, refer to Appendix A (Drawings).

G 12. The Ball Deposit Zone SHALL be made using 30 x 30 mm DAR with internal dimensions of 440 x 440 mm +/- 2 mm for the assembled component, refer to Appendix A (Drawings). The Ball Deposit Zone SHALL be rigidly attached to the track base with wood screws or similar where the top surface of the Ball Deposit Zone and the competition base plane SHALL be 30 mm +/- 2 mm, as shown in Figure 1.

G 13. All screw or fastener recesses on the horizontal surfaces, including the DAR of the Ball Deposit Zone, of the competition track and SEESAW SHALL be filled and levelled.

G 14. The Formply base sheet with relevant features attached, not including the balls, SHALL be identified as the Competition Track as shown in Figure 1. The features include; the pivoting SEESAW and its supports in the centre of the track, the 3 x 3 grid for the random placement of the balls and the Ball Deposit Zone with defined fasteners.

G 15. The base sheet SHALL be tilted 0.5 degrees +/- 0.1 degrees along the longitudinal axis. This MAY be achieved by raising the foreground (Figure 1) longitudinal edge of the

track by 10 mm when pivoting about the background longitudinal edge. The longitudinal edges SHALL be nominally level.

G 16. Sharpie Medium White Paint Marker, refer Appendix A (Drawings), SHALL define the perimeter of the Start Zone and the System End Zone as per the supplied drawings. A sharp, scratched scribe line should be applied over this marking for greater accuracy.

G 17. The competition base plane, defined by the upper surface of the track sheet, SHALL be no less than 300 mm above the supporting floor at the International Final. The supporting table or frame is not shown in Figure 1. The track sheet MAY rest on the 2024 track and support structure.

G 18. The three meteorites SHALL be simulated using; a Wilson Tour Competition Ball (yellow in colour), a Prince Racquetball (blue in colour) and a Terrasphere Table Tennis Ball (orange in colour). Each ball SHALL be randomly assigned to any of the nine positions within the 3 x 3 grid. Each ball SHALL be supported by one of nine ø18 mm x 45° countersunk holes on the competition base plane, refer Appendix A (Drawings). The positions of the three balls will be determined randomly, **after** the device is set-up, at the start of each competition run, and naturally will vary from team-to-team and run-to-run. Teams will not know the position of the balls for each run, before completing the setup of the system.

G 19. Teams SHALL accept that the presence of bright lighting and photographic equipment including flash and infrared systems MAY be part of the competition environment.

G 20. Teams SHALL accept that the presence of air conditioning/ventilation induced air movement MAY be part of the competition environment.

G 21. Teams SHALL accept track assembly, components, and balls are made within defined tolerances.

G 22. Campus Organisers MAY modify the rules and or competition track for their local competition but the guidelines and rules as stated SHALL be strictly adhered to at the International Final.

G 23. At the International Finals, video recording SHALL be used to determine placings if potential podium winning time scores are within 3 seconds.

G 24. Teams SHALL accept there may be variability of the roughened SEESAW surface.

PROOF OF CONCEPT SYSTEM

G 25. The system SHALL cease all operations within 120 seconds. The system SHOULD use an identifying signal, for example a LED or similar visual or audible signal, to indicate when all electrical and/or mechanical functions have ceased.

G 26. Untethered or tethered flying systems SHALL NOT be used, refer G2. The system or separated components SHALL be fully supported by the competition track at all times.

G 27. Prior to the start signal, the system SHALL only contact the upper surface of the competition track within the Start Zone. The system microelectronics MAY be initialised but SHALL not perform any functions. The overall system SHALL fit within a virtual 400 mm cube with one surface of the cube parallel with the upper surface of the competition track base plane, as indicated as the Start Zone of Figure 1.

G 28. To earn points for DISTURBscore, MOVEscore, LANDINGscore, DEPOSITscore, ENDscore and RUNTIMEscore the system SHALL complete the tasks as defined in the scoring formula (see SCORING).

G 29. The system SHALL be in control of the balls and the safety of the process SHALL be considered, refer to G4.

G 30. The system MAY comprise multiple separate systems, or a system that separates into multiple, unconnected sub-systems. The entire system SHALL meet G27 requirements.

G 31. To commence setup, a track official SHALL call the team to the track which SHALL NOT have the balls in place (see R15). On the command of a track official, the setup SHALL begin. The maximum setup time SHALL be 120 seconds. Teams SHALL set-up their system during this time. Setup jigs MAY be used but any items left on the track at the end of setup time SHALL be considered part of the system and subject to G27.

G 32. In the case where the International Final is conducted remotely, team members SHOULD NOT block sight of the track from the audience, judging and video camera side of the competition track during setup or the run.

COMPETITION RULES

Objective

Points SHALL be awarded for achieving particular milestones including: the system disturbing and/or collecting the balls; negotiate the seesaw, or narrow gaps; relocating the balls to the end zone or ball deposit zone while controlled or supported by the system; the successful deposit of the balls into the deposit zone; and the time taken to deposit ALL balls to the storage bunker and the system finishing fully within the System End Zone.

R 1. The following conditions SHALL result in a zero RUNscore: The system (or any part of the system) being lost off the track (no longer fully supported by the track surface or features) - See R25; the system making contact with any of the external nominally vertical surfaces or underside of the competition track; the setup is found to be in violation of any of the system starting location and size constraints; the team members control, intervene or touch the system in any way during the run.

System Design and Fabrication

R 2. Teams SHALL manufacture and fabricate their “proof of concept prototype” system themselves using commonly available materials, components and methods.

NOTE: At the International Final Campus Organisers MAY be required to confirm that the system presented has been appropriately manufactured in keeping with the spirit of

the competition. While teams MAY purchase components "off-the-shelf", it is not intended that they purchase entire systems / major subsystems as solutions directly.

R 3. In keeping with the spirit of the competition, teams SHALL NOT use LEGOMindstorm® or similar comprehensive kitted systems at the International Final. Lego components are allowed.

R 4. In keeping with the spirit of the competition, teams MAY use Arduino or similar PIC based components.

R 5. In keeping with the spirit of the competition, teams MAY adapt / modify / integrate elements sourced "off-the-shelf".

R 6. Systems using electric battery storage devices SHALL have an appropriately sized fuse connected to one of the battery leads.

Pre-Setup Scrutineering

R 7. As directed, teams MAY attempt two runs.

R 8. The system MAY be modified between runs.

R 9. The mass of the team's system (SYSTEMmass) SHALL be measured and recorded by a track official. The system mass does not include the balls, or any positioning jigs or setup equipment used by the team but removed from the track before the run starts. The SYSTEMmass SHALL NOT be greater than 6 kilograms.

Pre-run System Setup

R 10. The team SHALL then be called to the trackside. The track SHALL be clear of the balls which will be placed onto the track by a track official once the setup time has finished (see R15).

R 11. There SHALL be no contact by team members or their system with the Competition Track before setup time commences as directed by the track officials.

R 12. When ready, an official will signal that the setup SHALL commence. The team SHALL be allowed a maximum of 120 seconds for setup. During this time, they are to set up their system within the start zone, on the competition track.

R 13. During setup, the team MAY use additional objects not considered part of the "system" to assist with setup. Any additional objects used SHALL be removed from the competition track at the conclusion of the setup time. The mass of these additional objects SHALL NOT be included in the SYSTEMmass.

R 14. After setup, the plan projection of the system SHALL lie fully contained within the Start Zone and supported by the competition track nominally horizontal surface. The installed system SHALL be fully contained within a virtual cube with 400 mm sides inside the competition track periphery, designated as the Start Zone of Figure 1. One face of the

cube SHALL be adjacent to a nominally horizontal track surface. The dimensions SHALL be checked using C shaped gauges, with a 400 mm + 0.0 mm / - 1.0 mm square internal cavity, typically achieved via laser cutting.

R 15. The team SHALL indicate to the appropriate competition official when their setup is complete. After the setup of the system has been completed, the competition organiser will utilise a random position generator to determine the position of the balls for this run. The team SHALL NOT touch or modify their device in any way in response to the positioning of these balls. After setup, and prior to running, everything placed and left on the competition track, except the balls, SHALL be considered to be part of the system.

R 16. Competition officials SHALL use the supplied Random Position Generator to determine the position of the balls once the team has completed the setup of their system. The balls will then be placed in these locations using the ø18 mm x 45° countersunk holes on the base plane. The balls SHALL be placed on the track by a competition official.

R 17. After the setup and during the run, view of the Ball Deposit Zone and System End Zone SHALL NOT be blocked. This is to allow video recording of when the system stops all functions. Video camera(s) and audience view SHALL be toward the Ball Deposit Zone side of the competition track.

R 18. Officials SHALL inspect the team's setup of their system, using the gauges, rulers and large square edges. If the setup is found to be in violation of any of the system starting location and size, at the discretion of the competition officials, the system MAY ONE TIME ONLY for each run be removed from the track and the setup process IMMEDIATELY repeated. If after the second setup the system is again in violation of the setup rules a zero RUNscore SHALL be recorded.

Run Process and Timing

R 19. On instruction by a clapper board type signal from a track official the run SHALL commence. The start SHALL be counted 3-2-1-clap at nominally one-second intervals. The system SHALL be started by a single team member, using a single hand, via a single action, that does not impart any motion or energy to the system. Attaching wires, fitting electrical terminals, or fitting plugs SHALL NOT be considered a single action. Teams SHOULD install a reliable and easily accessible switch or mechanical trigger to ensure safe and reliable starting. Systems must only have a single starting switch or trigger mechanism.

R 20. If the team member accidentally or prematurely starts the system, at the discretion of the competition officials, the system MAY ONE TIME ONLY for each run be removed from the track and IMMEDIATELY reset and started again after repeating the setup procedure. Rules R10 to R21 SHALL be adhered to. This rule SHALL NOT be used to extend the setup time.

R 21. After performing the single action start, team members SHALL NOT control or touch the system in any way during the run. Wireless control SHALL NOT be used. Team members SHALL NOT interfere with the system. The team SHALL wait for a track official's approval to touch the system after the run has started. If team members choose to intervene to protect a system that is malfunctioning, a zero RUNscore SHALL be

recorded. In the case that a system is driving off the track a team member MAY catch it and protect it from damage, noting that a zero RUNscore SHALL will be recorded.

R 22. During and at the end of the run (see R28), the system MAY contact the surfaces of the Ball Deposit Zone, the base plane of the track, the SEESAW and any of the pivot assembly for the SEESAW.

R 23. The system SHALL NOT contact any of the external vertical faces of the track, or any track or ground surface below the base plane, or the underside of the nominally horizontal surface of the track. Any such contact SHALL result in a zero RUNscore being recorded.

R 24. During the run, the system and/or balls MAY extend or pass beyond the edges of the perimeter of the competition track. The system MAY not collapse back to a 400 mm cube.

R 25. The run SHALL be designed to finish within 120 seconds. For timing, the run SHALL be deemed to be complete when all functions of the system have ceased. If a micro controller is used, an LED or similar visual signal SHALL be used to indicate when the micro controller program has ended.

R 26. At the completion of the run, all parts of the system SHALL cease controlled or powered translation or rotation, and remain in this state indefinitely relative to the competition base plane. Mechanisms and items within the system MAY continue to move (i.e. to swing, sway or vibrate) but no further functions may be executed.

R 27. The team or system MAY indicate to the timekeepers when they declare their run to be complete. However, the track officials SHALL make the final judgment as to when the system ceases translation and all functions have ceased and the recorded time MAY exceed the team's or system's declaration.

R 28. At the completion of the run, the system SHALL be fully contained within the perimeter of the System End Zone (but not the Ball Deposit Zone) to receive the ENDscore.

R 29. To ensure that judging has been completed, teams SHALL NOT retrieve their system or assist in gathering other items until directed by a track official.

R 30. RUNtime SHALL be recorded when the system ceases controlled or powered translation or rotation, and remain in this state indefinitely relative to the competition base plane. The time SHALL be rounded up to the nearest half second.

Run Scoring

R 31. The relevant DISTURBscore SHALL be awarded for any balls which are no longer supported in the 3 x 3 grid which contains ø18 mm x 45° countersunk hole locations to support the ball. Balls MAY be left on track, cleared off the track, or retained by the system. Movement or relocation of a ball that is still fully supported by ANY ø18 mm x 45° countersunk hole at the conclusion of the run SHALL NOT count toward the DISTURBscore.

R 32. The DISTURBscore for each of the three balls in the randomly assigned location (see supplied random number generator) using the ø18 mm x 45° countersunk holes on the base plane SHALL be 5 points.

R 33. The MOVEscore for each of the three balls SHALL be 10 points. The system SHALL fully support (i.e. only in contact with the system) and be in control of the balls at some point during the run to receive a MOVEscore.

R 34. The LANDINGscore is only awarded when a zero has been recorded for the DEPOSITscore. The LANDINGscore is awarded when the system moves the ball(s) over, under or around the SEESAW, such that the system is in control of the ball(s) AND the system is fully supported on the System End Zone "left side" of the track in Figure 1 (which also includes the Ball Deposit Zone). The system SHALL NOT be supported by or touching the SEESAW at the completion of the run. If the system adheres to these requirements, the LANDINGscore SHALL be 10 points for each of the balls.

R 35. The relevant DEPOSITscore SHALL be awarded for balls which are deposited and fully contained in the storage bunker and are only in contact with the inner vertical walls and base plane of the Ball Deposit Zone. The balls SHALL NOT be in contact with the system.

R 36. The DEPOSITscore for each of the balls SHALL be 30 points.

R 37. At the conclusion of the run, balls MAY be left in their positions, lost or discarded off the track, or retained within the system, however these SHALL NOT earn a DEPOSITscore.

R 38. The ENDscore is awarded at the conclusion of the run if the DEPOSITscore is received for all balls (see R35) and the system meets the boundary requirements as per R28 and R35 and not be in contact with any of the Balls. If the system adheres to these requirements, the ENDscore SHALL be 50 points.

IF all three balls are successfully deposited (full DISTURBscore, MOVEscore, DEPOSITscore and ENDscore) then the run SHALL attract a RUNTIMEscore, based on the time taken to complete the run (the RUNTIME).

R 39. Each team’s overall COMPETITIONscore SHALL be calculated based on their maximum RUNscore plus 50% of their minimum RUNscore gained from a separate run.

R 40. If two or more teams have equal COMPETITIONscores the competition placing SHALL be determined by the SYSTEMmass of these teams. The lower SYSTEMmass SHALL be preferred and will be calculated based on the average recorded SYSTEMmass from both runs.

Conditions Determining Zero RUNscores

R 41. If at any time during the run, or at its conclusion, any part of the system is lost or discarded off the track, a zero RUNscore SHALL be recorded.

R 42. The setup or run SHALL NOT contaminate or damage the balls or track. Teams presenting a system that damages or is deemed to have the potential to damage the competition track or balls MAY be disqualified from the competition. IF damage or contamination is deemed to have occurred to the track or balls a zero RUNscore MAY be awarded at the discretion of the competition officials.

R 43. Violations of procedural rules SHALL result in a zero RUNscore being recorded.

R 44. The competition organisers' decisions on all matters pertaining to the competition SHALL be final.

SCORING

The COMPETITIONscore SHALL be calculated using the following:

COMPETITIONscore = Max RUNscore + Min RUNscore/2

$$RUNscore = \begin{pmatrix} DISTURBscore + MOVEscore + LANDINGscore + DEPOSITscore + \\ ENDscore + RUNTIMEscore \end{pmatrix}$$

DISTURBscore: *5 for each ball displaced from their randomly assigned locations.*

MOVEscore: *10 for each of the balls fully supported and in control by the system.*

LANDINGscore: *10 for each of the balls, where the balls are still in control by the system at the end of the run where the system and balls are fully to the left of the system end zone boundary. Only awarded for an incomplete run.*

DEPOSITscore: *30 for each ball deposited.*

ENDscore: *50 for the system to be fully contained within the perimeter of the System End Zone with all balls deposited into the Ball Deposit Zone.*

The following RUNTIME scoring is contingent upon the run achieving full DISTURB, MOVE, DESPOSIT and ENDscores:

RUNTIMEscore: *RUNtime = time in seconds for a run that correctly deposits all balls. Points are calculated based on the RUNtime and according to the following formula RUNTIMEscore =* $(120 - RUNtime)\ x\ 0.5$ *with a minimum RUNTIMEscore = 0*

Notes:

RUNtime is measured from the 'Start Clap' command until the system ceases controlled or powered translation or rotation. The system MAY sway but there SHALL NOT be in translational motion relative to the competition track.

RUNtime SHALL be rounded up to the nearest half-second. For example, 15.2s becomes 15.5s and 15.7s becomes 16s

SYSTEMmass = the net mass, in grams, of the system. Excludes the balls and setup tools.

Example score calculation:

The system disturbs all three balls, and collects and moves two balls to the end zone, but does not deposit either ball. Two balls are retained by the system which finishes completely within the system end zone.

(3 x 5) + (2 x 10) + (2 x 10) = 55

The system disturbs and moves all balls, traverses the SEESAW, deposits all balls and finishes in the system end zone in a run time of 20 seconds.

*(3 x 5) + (3 x 10) + (3 x 30) + 50 + (120-20)*0.5 = 235*

FREQUENTLY ASKED QUESTIONS

1. **Can part of a system be "discarded" off the competition track without penalty?**
   No. If the system, or part of the system, is discarded off the competition track this would lead to a zero RUNscore (R23, R24, R28, R37 and R41).

2. **Can part of the system overhang the extremities of the competition track without penalty when negotiating the track?**
   Yes, (see R24). After the run commences the system or balls MAY extend beyond the edges of the perimeter of the Competition Track. Contact between the system and anything below the track base plane is not permitted at any time.

3. **Autonomous – does this mean that the system on the competition track cannot receive input or instructions from a Subsystem off the track (such as a computer)? Or does it mean that the system on the competition track can receive input from a Subsystem off the track (such as a computer) but that Subsystem (computer) cannot be manipulated by a team member during the run? An example of the second would be if the system was controlled by motors that ran to a pre-programmed route transmitted from the computer.**
   Autonomous in this competition implies every control system for the system is to be part of the system on the competition track that fits within the start volume. No remote-to-the-track control systems of any sort can be used (manual or pre-programmed, hard-wired or wireless).

4. **Are programmable chips or microcontrollers allowed?**
   Yes. You can use a programmable chip or microcontroller, but there is to be no remote communication during the run. However, LEGO ® Mindstorms ® or similarly kitted systems are not allowed (see R3, R4, R5).

5. **What is the allowable voltage and power of any employed electrical systems?**
   There are no restrictions this year, but it needs to be risk assessed as safe. Refer G4 and R6.

6. **Can off-the-shelf items be used?**
   Commonly available components such as toy and machine parts are able to be used, however full kits or systems such as LEGO ® Mindstorms ® are not allowed. The spirit of the competition is that students manufacture and fabricate their system themselves, meaning that professionals are not engaged to do it for them. It is possible for some assistance to be obtained (e.g.; for a weld) but this should be minimal or where possible be done by the students themselves. The production of major components should not be outsourced.

Further Competition Details

INTERNATIONAL COMPETITION FINAL

The national organisers are working on the international competition dates and event format, and more information will be posted to teams and competition organisers as soon as it is available.

Competition sponsors Weir Minerals Australia will offer the following prizes and cash awards for participants in the International Final.

Overall Winning Team: **AUD$3,000**
Second Place Team: **AUD$2,000**
Third Place Team: **AUD$1,000**

Weir Minerals' Prize: **AUD$400**
NCED Best Design Prize: **AUD$400**

Campus Champion Prize **AUD$200**
(awarded to all competitors in the international final)

SPIRIT OF THE COMPETITION

Although the rules may look rigid you will find that they have been written in a way that allows, and in fact encourages creative and innovative solutions. This is not always the case in real-world engineering projects. In this project and competition, the rules are there because we have tried to be very clear on points which will be important when student groups come together for the International Final. For this reason, it is essential to work with your Campus Organiser from an early stage, and for the campus organiser to verify decisions with the International Competition Coordinators so that everyone has the same understanding of the meaning of the rules.

If you think you see a loophole, clear it with your Campus Organiser before you rely on it in the competition. Even if it is accepted at the local level, you might be in for a shock at the International Final where the interpretation might be different. Provision will be made for confidentiality, so your idea will not be passed on to other students.

It is highly recommended that all students communicate with their Campus Organiser and that if a ruling is required by the International Competition Coordinators, this is sought by the Campus Organiser. Students SHOULD NOT contact the International Competition Coordinators directly for an individual ruling.

The competition tracks, at the Campus Competitions, State/Country semi-finals and the International Final, will be made with reasonable care but because it is a real engineering object it may well be "wrong" in various small ways. For example, the competition base plane might have a slight longitudinal slope. Your team is expected to consider these possibilities in your design and develop a system that can function even if the competition track has slight imperfections and inaccuracies. In other words, you are not allowed to blame failure of your system on some minor imperfection with the competition track.

A FINAL COMMENT ON SAFETY

Please be aware that in 2003 during a campus competition, a student was lucky to escape serious eye injury when a Subsystem went off unexpectedly. While Campus Organisers run their own competitions independently, they are strongly encouraged to consider all aspects of safety in relation to the conduct of their competition.

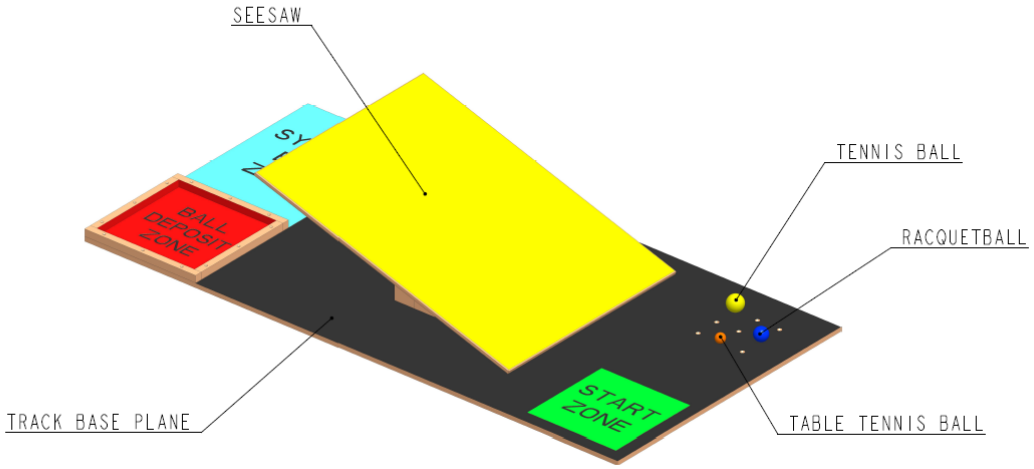
Personal Protective Equipment, PPE, required for the competition is determined by campus organisers for the campus heats. For the International final, it will be the International Final organisers.

*All participants **SHALL** use appropriate PPE during the building and development of their system. Refer to campus organisers for campus requirements.*

Appendix A –
Sheet 1 – Drawing 1 of 3. General Assembly

Sheet 2 – Drawing 2 of 3. F14 Formply Base Track

Sheet 3 – Drawing 3 of 3. Seesaw MDF Table Details



REV	DESCRIPTION	BY	DATE	APPV'D
A	RELEASED FOR CONSTRUCTION	MC		
I	RELEASED FOR CHECKING	MC		

REVISIONS

DRAWN TO AS1100-1992
ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE STATED
DO NOT SCALE

CAD GENERATED DRAWING
DO NOT MANUALLY UPDATE

TOLERANCES
LINEAR
0.±5.0
0.0±1.0
ANGULAR
0.±1.0 DEG
0.0±0.5 DEG

TITLE: WARMAN 2025 - GENERAL ASSEMBLY

PROJECT NO.: 2025	APPV'D			05-Feb-25	DRAWING NO: 001
FINISH: 3.2 UOS	CHK'D			05-Feb-25	REVISION: A
QUANTITY: 1	DRAWN	M. CARR		05-Feb-25	SCALE: 1:10
MATERIAL: SEE RULES		NAME	SIGNATURE	DATE	SHEET: 1/3 A3