27th WARMAN DESIGN & BUILD COMPETITION – 2014

Weir Minerals and Engineers Australia

Project "ELEVATE":
Emergency Lift and Exchange of Volatile And Toxic E-waste

CONTEXT:
The Gondwanan people are concerned for their environment and highly passionate about sustainability issues. As an industrialised society, they like many others are struggling with the safe disposal and handling of waste electrical and electronic equipment, known as e-waste. Often e-waste contains high levels of volatile and toxic chemicals that can leach into the soil or be released into the atmosphere over time, impacting nearby communities and the environment.

DILEMMA:
In the "ACME Pinnacle Laboratory", the Gondwanan Environmental Protection Agency (GEPA) is currently examining its emergency response capability in relation to transporting e-waste. A concept for a new autonomous system to transport the processed e-waste is being investigated. The e-waste has been shredded and processed, but still contains potentially volatile and toxic chemicals. The shredded waste can be packaged into containers for transport but must be handled with extreme care as it may still be unstable. It is envisaged that during the emergency removal of the waste that a range of obstacles at varying heights may be encountered. GEPA is struggling with the development of a system to efficiently and safely transport the e-waste without potential environmental and personnel risk.

CHALLENGE:
The desire is to develop two autonomous ground based devices that will work together to efficiently transport the packaged e-waste over an obstacle of significant height. GEPA staff are struggling to build a laboratory based concept to satisfy this task. Fortunately, teams of engineering students from Earth are about to visit Gondwana as part of their work experience programmes. On 26 previous visits engineering students have rendered invaluable assistance with such engineering problems, and the Gondwanans again seek help from these budding engineers.

Objective

The objective is to design, build and prove a prototype ground based system in a laboratory environment that serves to transport a payload over a defined terrain which includes negotiating an obstacle of sufficient height.

Can you design the best system for the Emergency Lift and Exchange of Volatile And Toxic E-waste ?

National Organisers:

A/Prof Craig Wheeler	craig.wheeler@newcastle.edu.au	Phone: 02 4033 9037
Dr Warren Smith	w.smith@adfa.edu.au	Phone: 02 6268 8262

Details follow:

- Competition Guidelines
- Competition Rules
- Frequently Asked Questions
- Further Competition Details
- Spirit of the Competition

Document Control
Version 1.0 – 4 February 2014
Version 1.1 – 24 March 2014: Further detail added to G7, G26, R47 and to the definition of IEXCHANGE.

Competition Guidelines

Version 1.0 Released: 4 February 2014

Version 1.1 Released: 24 March 2014

ELIGIBILITY

G 1. Teams of notionally four first or second year, nominally mechanical engineering students, in Australian or New Zealand universities (or other universities by arrangement), may enter the competition. Teams of three or four are strongly recommended.

***NOTE**: It is recognised that some campuses are using the Warman Competition as a 1st Year project and that team sizes may be necessarily forced for logistic reasons to be larger than 4. Both year and size variations are acceptable.*

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 occurs when the control of energy in a system is lost.

G 3. As appropriate, protective clothing, footwear, safety glasses or full face masks should be worn by students working on systems during construction, during testing, and during competitions.

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 safe operation and produce risk assessment documentation in order to compete in either the campus heat or at the National Final.

G 5. Compressed gas systems may be used but students must gain local coordinator approval based on a safety assessment.

Such systems presented at the National Final will be examined against the following principles and must be acceptable to the National Coordinator.

- 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.

COMPETITION TRACK, EQUIPMENT AND ENVIRONMENT

G 6. The competition track shall be fabricated using primarily two sheets of Medium Density Fibreboard (MDF), each with nominal dimensions 2400 x 1200 x 18 mm, arranged as shown in Figure 1 and Figure 2. The supporting frame for these sheets may be fabricated by any convenient method.

NOTE: *The MDF sheets as supplied in the ACT are slightly larger than the nominal 2400 x 1200 dimensions. They are 2420 x 1210. They do not need to be cut down. The 12 x 12 DAR fences (see rule G 18) on the board extremities are flush with the edge of the as supplied boards.*

G 7. The two MDF sheets and relevant attached features shall be identified respectively as Track Segments 1 and 2 and collectively as the competition "track". The attached features refer specifically to the 12 x 12 DAR fences and 90 x 35 mm timber walls, and exclude the 70 x 35 mm vertical timber supports.

G 8. The tops of the two MDF sheets shall define the competition base plane which is nominally horizontal. The heights of the track segments shall be adjusted so that the step between the two track segments does not exceed 1.0 mm.

G 9. The competition base plane shall be no less than 300 mm above the supporting floor at the National Final.

G 10. Track Segment 1 shall contain the Start Zone at one end and the Exchange Zone at the opposite end. Both the Start Zone and the Exchange Zone are 600 mm in length and span the width of the track segment as shown in Figure 2. The Start Zone and the Exchange Zone shall be marked by scribing and highlighting with a fine tip permanent marker.

G 11. Track Segment 2 shall contain the Exchange Zone at one end and the Finish Zone at the opposite end. Both the Finish Zone and the Exchange Zone are 600 mm in length and span the width of the track segment as shown in Figure 2. The Finish Zone and the Exchange Zone shall be marked by scribing and highlighting with a fine tip permanent marker.

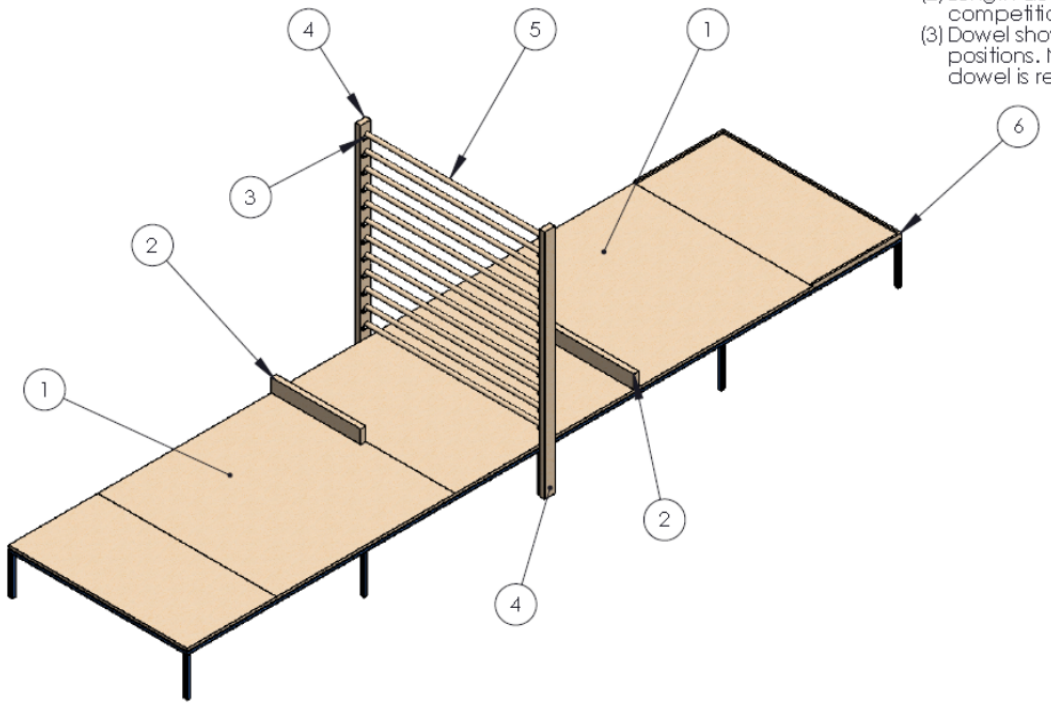
G 12. The track segments shall have their longitudinal axes inline and butted together to form the competition track along the short edge of the track segments forming the boundary of the two Exchange Zones as shown in Figure 2.

G 13. Two low walls shall be formed with 90 x 35 timber positioned transversely on Track Segments 1 and 2 at the entry to the respective Exchange Zone. The walls shall run transversely from the centreline of the track, be aligned along the edges of the Exchange Zones and be positioned diagonally opposite as shown in Figure 2.

G 14. A length of 25 mm diameter timber dowel shall be supported horizontally and form the crossbar over which the container with payload is to be transported. The crossbar shall be able to be positioned horizontally at 100 mm height increments, ranging from 100 mm up to 1200 mm above the competition base plane, as shown in Figure 1 and Figure 2. The height of the bar is to be referenced from the competition base plane to the top of the 25 mm diameter timber dowel when supported, as detailed in Figure 2. Flats shall be milled (or filed) on each end of the dowel to suitably support the crossbar. Details of the crossbar are shown in Figure 3. Note the crossbar is to be straight to within 5 mm over its length as noted in Figure 3.

ITEM	DESCRIPTION
1	1200x2400x18 MDF SHEET
2	90x35 TIMBER[1]
3	25x25x3 ALUMINIUM EQUAL ANGLE
4	70x35 TIMBER[2]
5	∅25 TIMBER DOWEL[3]
6	12x12 DAR

Notes: (1) Length determined by width of track.
(2) Length determined from height of competition base plane above floor.
(3) Dowel shown in all possible height positions. Note that only one length of dowel is required.



REV	DESCRIPTION	BY	DATE	APP'D
A	RELEASED FOR CONSTRUCTION	MC	30/01/14	CW
1	RELEASED FOR CHECKING	MC	30/01/14	CW

REVISIONS

CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES, TOLERANCES ARE:
DECIMALS: 0.= ±0.10; 0.0 = ±0.05; 0.00 = ±0.02
ANGLES: 0.= ±0.0000 DEG; 0.0= ±0.5000 DEG; 0.00 = ±0.1000 DEG

MATERIAL: AS SPECIFIED

FINISH: AS SPECIFIED

THIRD ANGLE PROJECTION

	NAME	SIGNATURE	DATE
DRAWN	M. CARR		
CHK'D	C.VAN EELEN		
APP'D	C.VAN EELEN		

TITLE: 2014 WARMAN COMPETITION TRACK ISOMETRIC VIEW

A3

DWG NO: 1 | JOB NO: | REVISION: A | P/N:

SCALE: 1:20 | SHEET 1 OF 2 | QUANTITY: 1

FIGURE 1 – COMPETITION TRACK

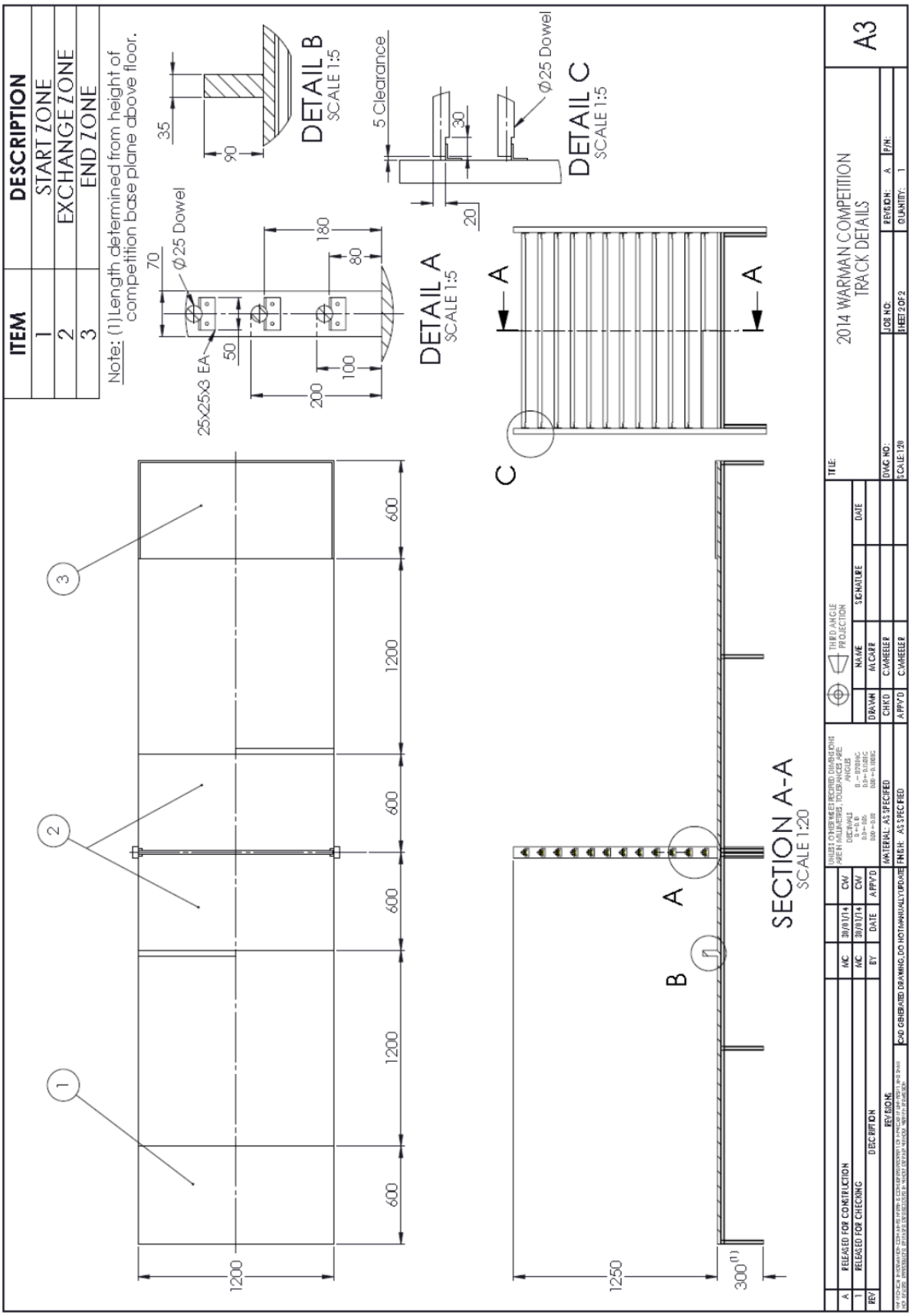


FIGURE 2 – DETAIL VIEW OF COMPETITION TRACK

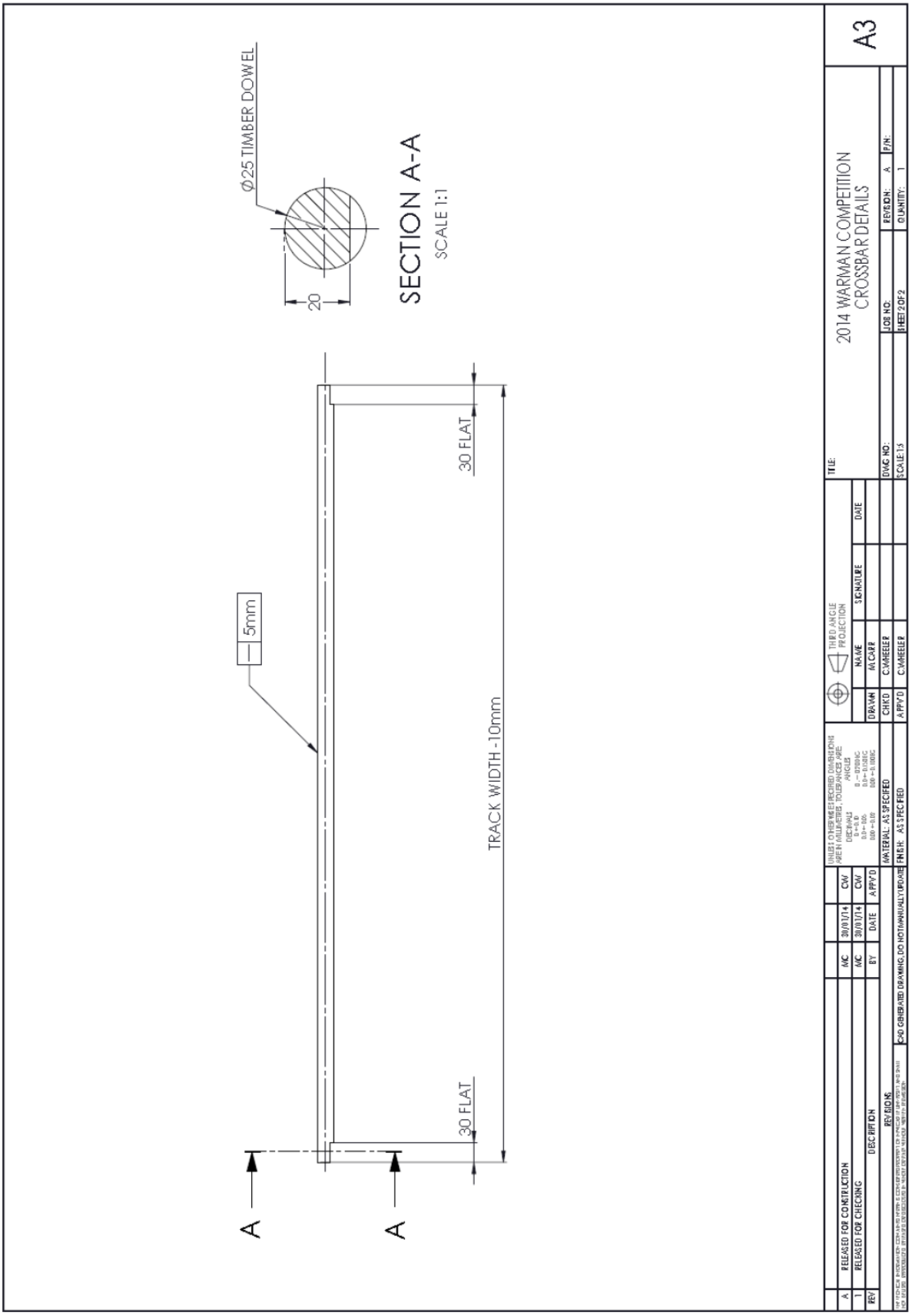


FIGURE 3 – DETAILS OF CROSSBAR

G 15. Two lengths of 70 x 35 mm timber secured vertically to the edges of the competition track shall act to support the crossbar at a range of heights. The vertical timber supports shall be fitted with 50 mm horizontal tabs constructed from 25 x 25 EA and spaced at 100 mm intervals, as detailed in Figure 2. The horizontal tabs act to provide vertical support, but not horizontally restrain the crossbar. Figure 2 shows details of the 70 x 35 mm vertical timber supports that shall support the crossbar.

G 16. The centreline of the 70 x 35 mm vertical timber supports shall be aligned with the join between Track Segments 1 and 2 as shown in Figure 2.

G 17. The centreline of the crossbar shall be aligned directly above the join between Track Segments 1 and 2 as shown in Figure 2. Lines shall be marked with a fine tip permanent marker on each horizontal tab to aid in alignment.

G 18. On Track Segment 2 and partially encompassing the Finish Zone as shown in Figures 1 and 2, the edges of the track (width and 600 mm each side) shall be fenced with 12 x 12 DAR (Dressed All Round) timber strips mounted on the top of the track base plane with their outside edges flush with the sheet edges. The strips will be mounted by countersunk screws (100 mm spacing) on the top surface of the sheets.

NOTE: *The 12 x 12 DAR fences should be considered as guides rather than barriers built to resist high collision loads. Damaging the fences is considered to be damaging the competition site and will cause a zero run score to be recorded.*

G 19. All exposed surfaces of the MDF and timber will be brush coated with one coat of Wattyl Water Based Estapol Clear – Satin followed by two coats of Wattyl Estapol Matt.

G 20. The payload used for the competition will be long grain rice.

PROTOTYPE SYSTEM

G 21. The system shall transport the container with nominated payload on the defined track and transfer the container with payload over the crossbar in accordance with the rules.

G 22. The system shall represent a ground based solution for traversing the track, lifting and transferring the container with payload.

G 23. Teams shall present a system comprising two devices and a container.

G 24. One device at least shall be “purely mechanical” (using no chemical energy (including batteries) and having no functioning electrical or electronic components). The other device may utilise electrical power and electronic circuitry.

NOTE*: Compressed gas systems may be used and qualify as “purely mechanical” but students must gain local coordinator approval as per Guideline G5.*

G 25. The two devices, to be referred to as “Device A” and “Device B”, beginning respectively in the Start Zone and the Exchange Zone on Track Segment 2, are to interact within the Exchange Zones to transfer the payload held within the container above the bar, with the aim to transfer the container with payload to the Finish Zone without dislodging the crossbar from its set height.

G 26. Device A shall be limited to contact with Track Segment 1 and Device B shall be limited to contact with Track Segment 2. Device A may make contact with Device B. All contact between Device A and Device B shall occur above the crossbar and be limited to within the Exchange Zone.

G 27. The container shall be reusable and perform the function of holding and constraining the payload. The container shall not require a separate electrical, chemical

or mechanical power source. The container should allow for quick and easy filling, weighing and emptying.

G 28. Systems that are deemed by the officials and judges to be hazardous will not be permitted to run. Employing any form of combustion is considered hazardous.

G 29. Systems that are deemed by the officials and judges to damage or have the capacity to damage the track or its features will not be permitted to run or will be disqualified.

G 30. Campus organisers are free to 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 National Final.

G 31. Teams must accept that the presence of bright lighting and photography including flash and infrared systems are part of the competition environment.

Competition Rules

RULE WORDING

R 1. The language of the rules is tiered. Those clauses expressed as “SHALL” are mandatory and failure to comply will attract penalties which in the extreme could lead to disqualification at the National Final. Those expressed as “SHOULD” or “MAY” reflect some level of discretion and choice.

MATERIALS AND MANUFACTURE

R 2. Students SHALL manufacture and fabricate their prototype system themselves using commonly available materials, components and methods.

NOTE: *At the National Final Campus Organisers may be required to confirm that the systems presented have been appropriately manufactured in keeping with the spirit of the competition. While students may purchase components “off-the-shelf”, it is not intended that they purchase systems / major subsystems as solutions directly.*

R 3. In keeping with the spirit of the competition, teams SHALL NOT use LEGO Mindstorm or similar comprehensive kitted systems at the National Final.

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”.

PROCEDURE

R 6. The net mass of the team’s system (comprising Device A, Device B, and the Container) SHALL be measured by an official.

R 7. Either Device A or Device B MAY be the purely mechanical device.

R 8. The team SHALL nominate how much payload they wish to transport. This amount of payload (long grain rice) SHALL be added to a standard vessel by an official.

R 9. The minimum allowable rice payload SHALL be 200 grams.

R 10. The system gross mass (comprising Device A, Device B, Container and Payload) SHALL NOT be greater than 10 kilograms.

R 11. The team SHALL then be called to the track side.

R 12. The team SHALL nominate the height that the crossbar is to be set for the run (from 100 mm to 1200 mm in 100 mm increments).

R 13. An official will set the nominated height of the crossbar.

R 14. Contact by team members or either device with the competition surface before setup commences is prohibited.

R 15. When ready, an official will signal that the setup has commenced and hand the team the payload in the standard vessel. The team SHALL be allowed a maximum of two minutes for setup. In this time they are to transfer the payload to their container and set up their devices; Device A in the Start Zone complete with container and payload and Device B in the Exchange Zone on Track Segment 2.

R 16. During setup, the team MAY use additional objects not considered part of the "system" to assist with setup, including the transfer of rice from the standard vessel to their container.

R 17. During setup, contact SHALL NOT be made by team members, their system, or any additional objects used to assist with setup, with any portion of the track other than the Start Zone and Exchange Zone on Track Segment 2.

R 18. The Team SHALL indicate to the appropriate official when their setup is complete.

R 19. After setup, and prior to running, Device A SHALL be subject to volume constraints. Device A, the container and payload SHALL be contained within a 400 mm cubic envelope. Top and bottom planes of the cubic envelope SHALL be parallel to the track surface. The total system at this time must be stationary and, in a view perpendicular with the competition surface, must not project beyond the edges of the Start Zone. The volume and positioning conditions SHALL be physically checked by an official.

R 20. After setup and prior to running, Device B must be stationary and, in a view perpendicular with the competition surface, must not project beyond the edges of the Exchange Zone on Track Segment 2. The positioning conditions SHALL be physically checked by an official. Device B is not subject to volumetric constraints after setup and prior to running.

R 21. After set up and prior to running, the devices cannot be held or supported or contacted by anything other than the competition surface and they must be ready to start. This prohibits team members from restraining by personal contact ready-to-release devices. Devices should be capable of remaining in the set up condition indefinitely.

R 22. On instruction and by a signal from the "official starter", the run SHALL commence.

R 23. The run SHALL finish within 120 seconds. This will be judged by an official.

R 24. Device A SHALL be started using a single action that does not impart motion or energy to the device.

R 25. After performing the single-action start of Device A, team members SHALL NOT control or touch either device in any way during the run. Wireless control is specifically prohibited. Any interference by team members SHALL result in a zero score for the run. If team members choose to intervene to protect a device that is malfunctioning, a zero score for the run SHALL be recorded.

R 26. Device B MAY start as a result of the transfer of the container with payload, or by contact (or other form of sensor activation) with Device A.

R 27. During the run the system SHALL NOT come into contact with anything below the primary competition surfaces (defined by the upper faces of the MDF sheets). The exposed surfaces of the 12 x 12 DAR fences can be contacted.

R 28. During the run, Device A SHALL NOT by design, contact the competition base plane of Track Segment 2, but MAY overhang Track Segment 2.

R 29. During the run, Device B SHALL NOT by design, overhang the projected extremities of Track Segment 2.

R 30. During the run, the system (comprising Device A, Device B, and the Container) SHALL NOT by design, contact the crossbar.

EXPLANATORY NOTE: *A system that simply scrapes or bumps the crossbar will not be penalised, provided the crossbar is not dislodged in the process. The crossbar is to*

be considered an obstacle and not a support. Systems that by design rely on contact with the crossbar, for example to provide support, will be penalised with a zero run score.

R 31. During the run, losing portions of the payload from the container SHALL NOT result in a zero run score.

R 32. At the completion of the run, the overall system must cease translation on the competition surface and remain in this state indefinitely relative to the competition surface. Mechanisms and items above the surface supporting the devices MAY continue to move but no further functions can be executed.

R 33. The team MAY indicate to the timekeepers when they declare their run to be complete. However, the time keepers SHALL make the final judgment as to when the devices cease translation and all functions have ceased and the recorded time MAY exceed the team's declaration.

R 34. At the completion of the run, the container SHALL be visible so as to determine its position relative to the Finish Zone. A measurement in the horizontal plane to the point of the container furthest from the Finish Zone SHALL be made by an official.

R 35. At the completion of the run, Device B SHALL be subject to volume constraints. Device B, the container and payload SHOULD be contained within a 400 mm cubic envelope. Top and bottom planes of the cubic envelope SHALL be parallel to the track surface. The system comprising Device B and the container at this time SHOULD, in a view perpendicular with the competition surface, not project beyond the edges of the Finish Zone. The volume and positioning conditions SHALL be physically checked by an official.

R 36. At the completion of the run, Device A SHALL NOT be subject to volume constraints.

R 37. To ensure that judging has been completed, teams SHALL NOT retrieve their devices or assist in gathering other items until directed by an official.

R 38. At the conclusion of the run, an official MAY request that the payload be transferred from the container back into a standard vessel to be re-weighed to establish the mass of the payload actually delivered.

R 39. Systems SHALL NOT damage or contaminate the competition track. Teams presenting systems that damage the track may be disqualified from the competition.

EXPLANATORY NOTE: *A component of the system left simply on the competition track does not constitute contamination. An example of contamination would be a sticky residue requiring significant effort to remove it, with the possibility of permanent change occurring to the surface finish.*

R 40. As directed, teams MAY attempt two runs.

R 41. The system MAY be modified between runs but the mass, volume and time constraints must be satisfied for a run to achieve a valid non-zero score.

R 42. Violations of procedural rules SHALL result in a zero run score being recorded.

R 43. The judges' decisions on all matters pertaining to the competition SHALL be final.

SCORING

R 44. Better systems will achieve the objectives of transporting the payload with higher transportation efficiency and over a greater height, while adhering to the timing, volume and positioning constraints.

R 45. The run score is based on the following formula:

Score = $$ADEPART * BDEPART * IEXCHANGE * ICONTROL * IBVOL * \left\{\left[\left(50 - \left(\frac{50}{360} * PLDIST\right)\right) * TRANSEFF\right] + \left(50 * \frac{BARHEIGHT}{120} * ILIFT * IBAR\right)\right\}$$

Where:

ADEPART = 1 if Device A fully leaves the Start Zone and does not contact the competition base plane of Track Segment 2
0 otherwise

BDEPART = 1 if Device B fully leaves the Exchange Zone and does not contact the competition base plane of Track Segment 1
0.75 otherwise

IEXCHANGE = 1 if container exchanged in Exchange Zone AND Device A and B not in contact outside Exchange Zone AND Device A and B not in contact at the end of the run.
0.5 otherwise

ICONTROL = 1 if container "controlled" (See Rule R47) during the run and in contact with Device B only at end
0.8 if container in contact with Device A at end
0.5 if container at any time independently on the competition surface or deemed not to have been "controlled" during the run
0 if container lost from competition surface or contact made by any part of the system with elements below the competition surface

IBVOL = 1 if Device B meets volume constraints at end of run
0.9 otherwise

ILIFT = 1 if container lifted higher than BARHEIGHT
0 otherwise

IBAR = 1 if crossbar remains at set height
0.5 otherwise

PLDIST = Distance (measured in cm or part-there-of) in the horizontal plane to the point of the container furthest from the Finish Zone as noted in Rule R46

BARHEIGHT = Height of crossbar (set height of crossbar measured to the nearest 10 cm interval with a maximum value of BARHEIGHT = 120 cm)

TRANSEFF = Transport Efficiency
= (PLDELIVER / PLATTEMPT)* PLDELIVER / GROSSMASS

PLDELIVER = Integer (mass of payload delivered in grams)
PLATTEMPT = Integer (mass of payload attempted in grams)
GROSSMASS = Integer (mass of system including attempted payload in grams)

R 46. PLDIST SHALL be based on the horizontal measurement from the Finish Zone boundary to the furthermost position of the container on the competition base plane.
If the container status is:

- fully in the Finish Zone, then PLDIST is zero;
- on, above, or overhanging the projected extremities of the competition track (excluding the Starting Zone), then PLDIST is measured in cm or part-there-of, from the Finish Zone boundary to the furthermost position of the container (where the maximum value of PLDIST recorded is 360 cm);
- fully in the Start Zone, then PLDIST is not measured and the run score is zero;
- or lost, then PLDIST is not measured and the run score is zero.

R 47. For the container with payload to be considered “controlled”, it must be in contact with and supported by one or more devices at all times. A penalty is applied if the container is left lying independently on the competition surface or has been thrown during the run. Dropping with no horizontal velocity component through a small distance (less than 100 mm) does not constitute throwing and is considered to be “controlled”.

R 48. The RUNTIME for the run SHALL be measured as the time from the start command being given to both Device A and Device B ceasing both translation on the competition track and gross motion above the competition base plane and being able to remain in this state indefinitely relative to the competition track. Mechanisms and items in the system may continue to move but no further functions can be executed.

R 49. Each team MAY attempt two runs. The Warman Competition Score shall be the higher Score achieved from either run plus half the Score achieved from the other run. The highest Warman Competition Score shall be declared the winner. The devices may be modified between runs but the mass, volume and time constraints must be satisfied for a run to achieve a non-zero run score.

R 50. If equal Warman Competition Scores are recorded by teams, teams tied SHALL be ranked based on the RUNTIME of their highest scoring run.

Frequently Asked Questions

1. Does the system have to stay in contact with the competition track at all times?

Yes and the rules do define what can be legally contacted.

2. Can part of a system be "discarded" off the track without penalty?

No, this would violate the rules and lead to a zero run score.

3. When is a system deemed to be stationary at the completion of the run?

The stop instant will be interpreted as the later of when all the contact points between the system and the competition site come to rest and when the functions being performed are observed to have ceased. It must be clear that the system could remain in the end state indefinitely. Some wobbling in the structure is acceptable but gross rotations are not.

4. Autonomous – does this mean that the system on the track can not receive input or instructions from a Subsystem off the track (such as a computer)? Or does it mean that the system on the track can receive input from a Subsystem off the track (such as a computer) but that Subsystem (computer) can not 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 track and fit within the start volumes. No remote-to-the-track control systems of any sort can be used (manual or pre-programmed, hard wired or wireless). Such configurations would be considered to be part of the system and violate position and volume constraints.

5. Are programmable chips allowed?

Yes, you can use a programmable chip, but there is to be no remote communication during the run. However, LEGO Mindstorm is not allowed.

6. What is the allowable voltage and power of any employed electrical systems?

There are no restrictions this year but it clearly needs to be safe.

7. Can off-the-shelf items be used?

Commonly available components such as toy and machine parts are able to be used. 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 (eg 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

NATIONAL FINAL

It is planned that the Weir-Warman National Final will be held Friday 26 - Sunday 28 September 2014 in Sydney at a location to be determined.

Prizes for Campus Winners and National Podium Places will be awarded at the National Final. A National Final "Judges' Prize" and "Design Prize" may also be awarded.

The planned format will have students gathering on Friday morning in Sydney. A tour of Weir Minerals Ltd will follow. Scrutineering and additional judging will be conducted on Saturday and there will be briefings, presentations and practice sessions held on Saturday. The actual running of the Final and the National Final Dinner will be on Sunday.

A team registration form will be available – please submit it to Engineers Australia (EA) as early as possible. Travel arrangements are coordinated by EA. Team details are required early August at the latest (unless otherwise advised).

Teams registering and accepting the invitation and sponsorship to participate at the Final also accept that their names and photographs and video of them can be used for publicity purposes by both EA and Weir Minerals. All team members and attending campus organisers will be required to sign an appropriate authority in relation to this use.

In meeting costs, the competition sponsorship has in past years funded two students per team. It is hoped that this will be possible again in 2014. Depending on funding, it is hoped that Campus organisers will also be funded. Campuses will be billed for additional students and for people who do not travel but for whom arrangements are made.

Spirit of the Competition

Although the rules may look rigid you will find that they have been written in a way which 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 National 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 National Organisers 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 competition. Even if it is accepted at the local level, you might be in for a shock at the national level 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 National Organisers, this is sought by the campus organiser. Students SHOULD NOT contact the National Organisers directly for an individual ruling.

The competition track 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 surface 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. 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.