28th WARMAN DESIGN & BUILD COMPETITION 2015

Weir Minerals and Engineers Australia

Project "EXTRACT":

Extract, Transport and Relocate Accumulated Treasure

CONTEXT:
The inhabitants of Gondwana, a small planet on the outer fringes of our Galaxy, are immensely wealthy and have accumulated vast reserves of intergalactic treasures. These treasures are typically stored in fenced areas with limited security. A recent review of security has identified the need for all treasure to be relocated to underground storage pits for safe keeping.

DILEMMA:
In the "ACME Pinnacle Laboratory", the Gondwanan Security Agency (GSA) is currently examining the logistics of relocating the treasure. A concept for a new autonomous system to extract, transport and relocate the treasure is being investigated. The treasure is typically packaged in spherical containers and stored in fenced areas and must be urgently transported to new underground storage pits. The GSA is struggling with the development of a system to efficiently and reliably relocate the treasure in a timely manner.

CHALLENGE:
The desire is to develop an autonomous ground based system that will extract, transport and relocate the packaged treasure. GSA 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 27 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 extract, transport and relocate a payload over a defined terrain.

Can you design the best system to Extract, Transport and Relocate Accumulated Treasure?

National Organisers:

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Details follow:

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

Document Control
Version 1.0 – 12 February 2015
Version 1.1 – 27 March 2015: R37, R38, FAQ8 and FAQ9 added.

Competition Guidelines

Version 1.0 Released: 12 February 2015
Version 1.1 Released: 27 March 2015

ELIGIBILITY

G 1. Teams that are eligible to represent their campus in the National Final will consist of students from a first or second year engineering design course/subject/unit in an Australasian (or other countries, by arrangement) mechanical-based BE or 3+2 ME programme. Teams shall consist of at least two students, with teams of three or four strongly recommended, but it is recognised that larger teams may be educationally appropriate at some universities. If an alternative team structure is envisaged, the National Organiser should be consulted to ensure that other teams are not unreasonably disadvantaged.

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, testing, and 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 Figures 1 and 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 and do not need to be cut down. The Dressed All Round (DAR) 42 x 30 mm timber representing the Fenced Areas on Track Segment 1 shall be fixed as per Figures 2 and 3 to maintain appropriate clearances between the golf balls and the sides of the fences, while the DAR 12 x 12 mm partially surrounding the Finish Zone shall be 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 as shown in Figure 1. The attached features shall include the DAR 42 x 30 mm timber representing the Fenced Area on Track Segment 1, the DAR 12 x 12 mm timber partially surrounding the 300 x 300 mm Storage Pit and the DAR 12 x 12 mm partially surrounding the Finish Zone on Track Segment 2. Collectively, Track Segments 1 and 2, the Fenced Area (including the golf tees) and Storage Pits shall be identified as the Competition Track.

G 8. The tops of the two MDF sheets of Track Segments 1 and 2 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. The Start Zone shall be 600 mm in length and span the width of Track Segment 1 as shown in Figures 1 and 2. The Start Zone shall be marked by scribing and highlighting with a fine tip permanent marker.

G 11. Track Segment 1 shall contain two partially Fenced Areas. The Fenced Areas will be formed with DAR 42 x 30 mm timber surrounding three sides as shown in Figures 1 and 2. The fourth (unfenced) side shall be marked by scribing and highlighting with a fine tip permanent marker. The 42 mm dimension shall represent the height of the fence. Each Fenced Area will have two holes to support two stepped plastic golf tees, and one further hole to locate a golf ball on the surface of the track, as detailed in Figures 2 and 3. The two 5.5 mm diameter holes to support the stepped golf tees shall be drilled to a depth of 12 mm. The golf tees used shall be (or be similar to) “Elim” nylon stepped golf tees as shown in Figure 5. The golf tees to be used to support the white golf balls shall be 38±1 mm high (Blue – “Elim - Driver Tee”), while the golf tees to support the yellow golf balls shall be 18±1 mm high (Orange – “Elim - 3 Wood Tee”). A single 12 mm diameter hole used to support the pink golf ball on the surface of the track shall be drilled to a depth of 10 mm as detailed in Figure 3. The 5 mm diameter shank of the golf tees shall be cut to a length of 10 mm.

NOTE: *Elim golf tees can be purchased online for approximately $3.00 for a packet of 8 to 10 tees from a number of sources, including powergolf.com.au and golfgear2go.com.au.*

G 12. Track Segment 2 shall contain the Finish Zone. The Finish Zone shall be 1200 mm in length and span the width of Track Segment 2 as shown in Figures 1 and 2. The Finish Zone shall be marked by scribing and highlighting with a fine tip permanent marker.

G 13. Track Segment 2 shall model three Storage Pits. Each pit shall be formed by cutting a hole through the MDF sheet and shall be located symmetrically to the longitudinal centreline

of the track as shown in Figure 2. One pit shall be 300 mm square and be surrounded on three sides by DAR 12 x 12 mm timber. Two further pits shall be circular, and be respectively 152 mm (6”) and 76 mm (3”) in diameter, as detailed in Figure 2. The two holes have been sized to allow cutting with commonly available imperial size holesaws if desired.

G 14. A collection system shall be constructed beneath the Storage Pits to collect and sort the golf balls based on the Storage Pit in which the golf balls were deposited. The design of the collection system will depend on the method of supporting the track and may consist of individual collection bins/buckets, a series of chutes, or an inclined trough. For reference, an inclined trough arrangement is shown in Figure 2 and detailed in Figure 4. The 300 mm wide trough is constructed from 18 mm thick MDF sheet and slopes towards the end of the track to facilitate the collection of delivered golf balls. The internal channels are designed to sort the golf balls based on the Storage Pit in which the golf balls were deposited by directing the balls into separate containers, as shown in Figure 6.

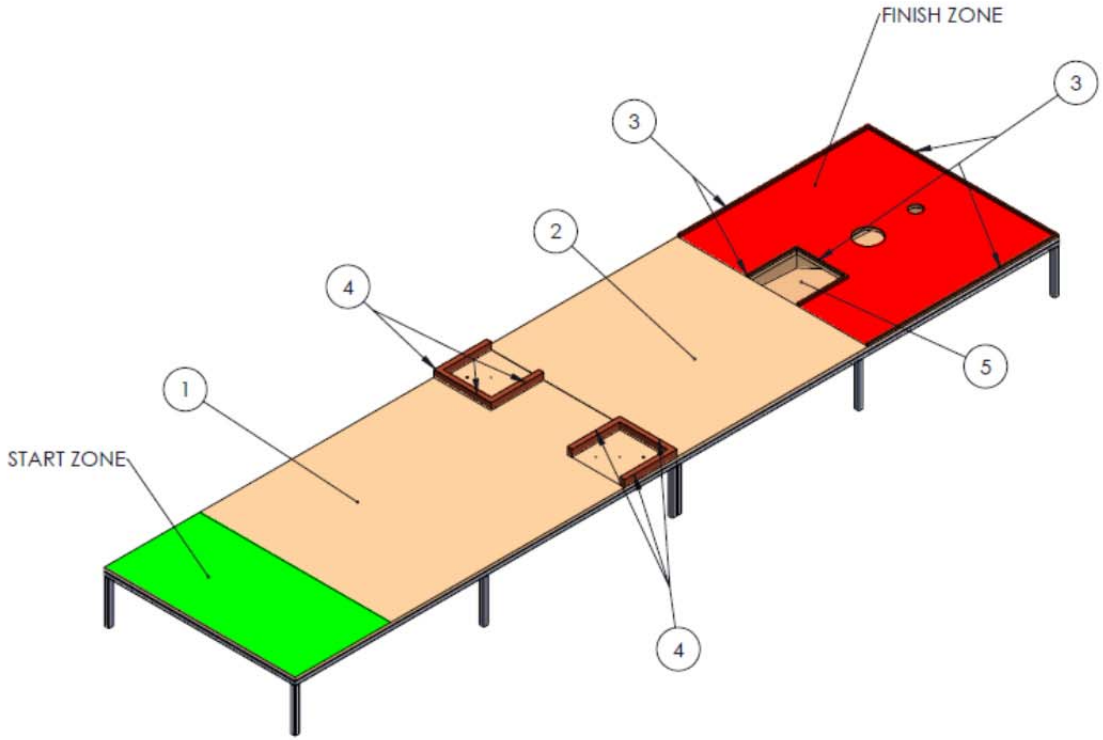
G 15. All exposed surfaces of the MDF and timber will be brush coated with one coat of Wattyl Water Based Estapol Clear – Satin followed by two coats of Wattyl Estapol Matt.

G 16. The payload used for the competition will be 6 regulation golf balls, comprising 2 white, 2 yellow and 2 pink balls. Different colours represent different values as nominated in R30. The golf balls shall be positioned according to colour, with the white balls closest to the longitudinal centreline of the track, followed by the yellow golf balls, and the pink golf balls closest to the outer edges of the track, as shown in Figures 6 and 7.

NOTE: *As defined Under the Rules of Golf, a golf ball weighs no more than 1.620 oz (45.93 grams) and has a diameter not less than 1.680 in (42.67 mm).*

ITEM	DESCRIPTION
1	TRACK SEGMENT 1 - 1200x2400x18 MDF SHEET
2	TRACK SEGMENT 2 - 1200x2400x18 MDF SHEET
3	DAR 12x12 TIMBER
4	DAR 42x30 TIMBER
5	COLLECTION TROUGH - 18 MDF SHEET[1]

NOTES: (1) SEPARATE DRAWING SUPPLIED FOR COLLECTION TROUGH



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES.
TOLERANCES ARE 0 +- 2MM UNLESS STATED OTHERWISE.
MATERIAL: AS SPECIFIED
FINISH: AS SPECIFIED

THIRD ANGLE PROJECTION
DRAWN TO AS 1100

	NAME	SIGNATURE	DATE
DRAWN	M.CARR		13/01/15
CHK'D	C.WHEELER		13/01/15
APPV'D	C.WHEELER		13/01/15

TITLE: 2015 WARMAN COMPETITION TRACK ISOMETRIC VIEW

A3

DWG NO: 001 | JOB NO: | REVISION: A | P/N:
SCALE:1:20 | SHEET 1 OF 4 | QUANTITY: 1

FIGURE 1 – Isometric view of competition track.

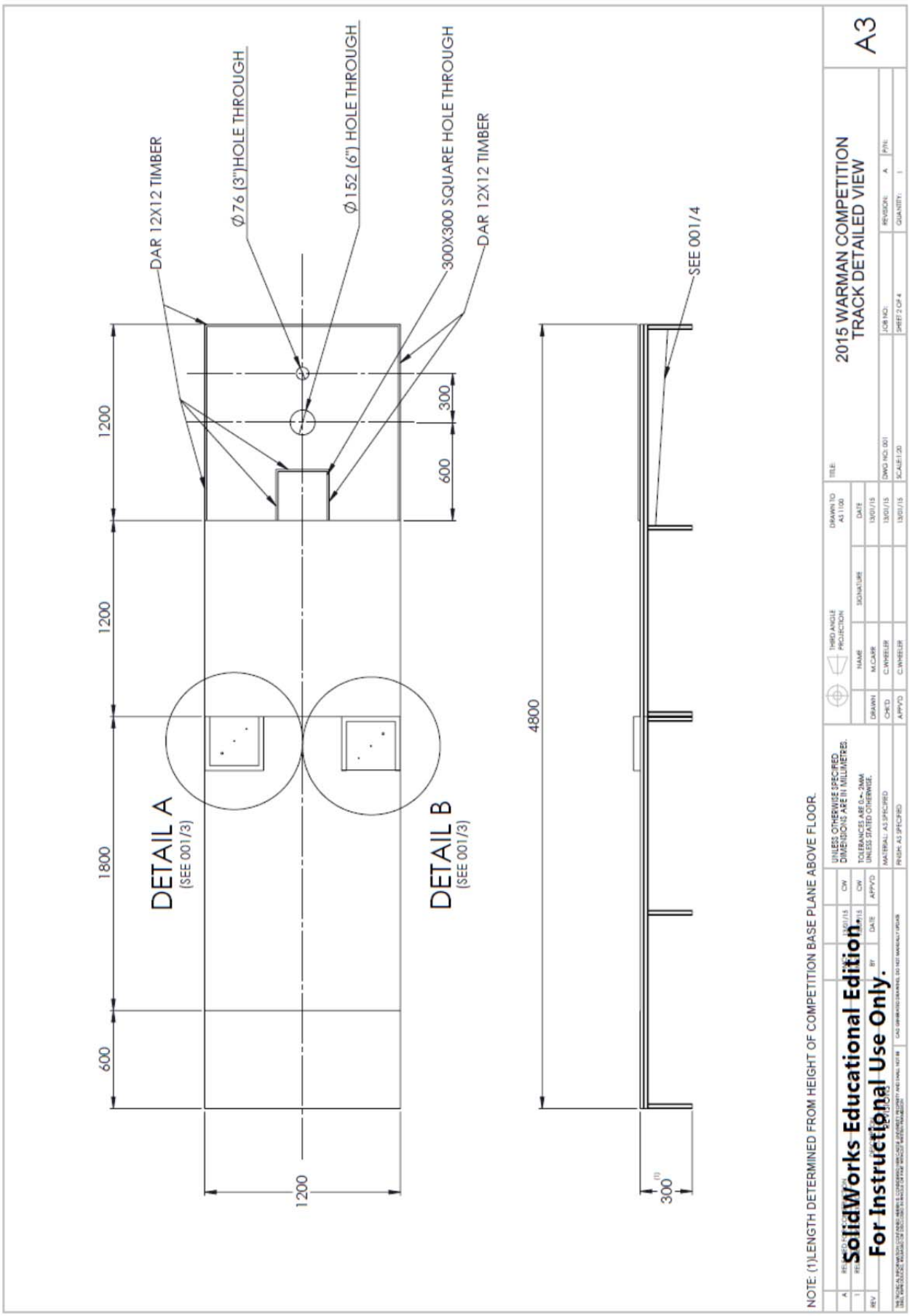
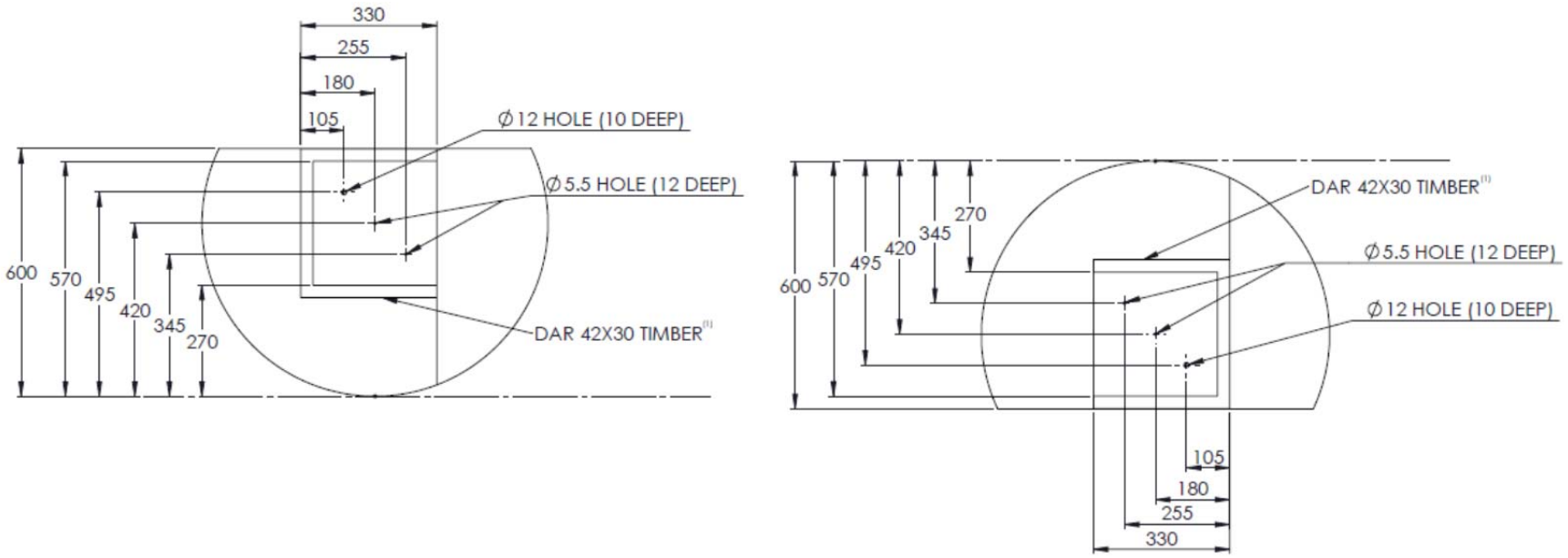


FIGURE 2 – Detailed view of competition track.



NOTE: (1) THE DAR 42X30 MM TIMBER TO BE ORIENTATED VERTICALLY TO PROVIDE A 42 MM HIGH FENCE.

A	REVISED FOR CONSTRUCTION		13/01/15	CW
1	REVISED FOR CONSTRUCTION		13/01/15	CW
REV	DESCRIPTION	BY	DATE	APP'D

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CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE

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TOLERANCES ARE 0.+- 2MM UNLESS STATED OTHERWISE.

MATERIAL: AS SPECIFIED

FINISH: AS SPECIFIED

THIRD ANGLE PROJECTION

DRAWN TO AS 1100

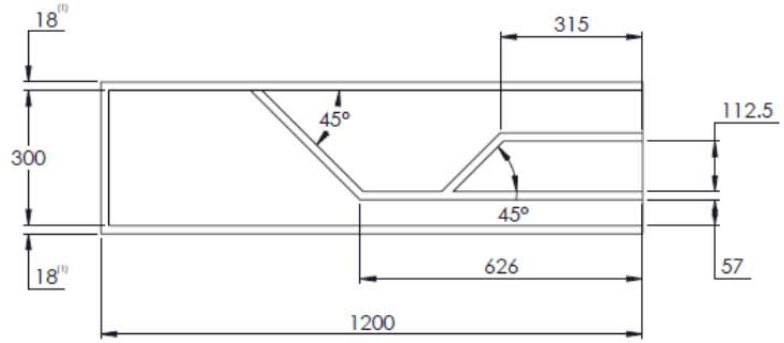
	NAME	SIGNATURE	DATE
DRAWN	M.CARR		13/01/15
CHK'D	C.WHEELER		13/01/15
APP'D	C.WHEELER		13/01/15

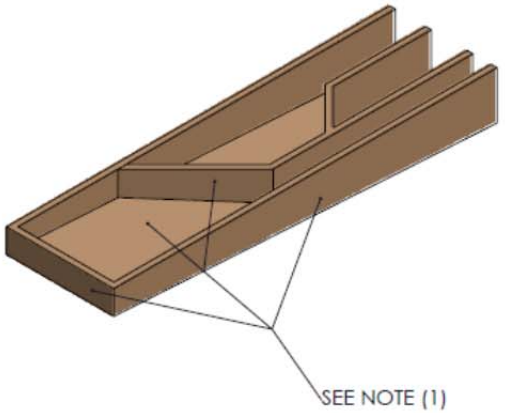
TITLE: 2015 WARMAN COMPETITION TRACK FENCED AREA DETAIL

A3

DWG NO: 001		JOB NO:	REVISION: A	P/N:
SCALE:1:10		SHEET 3 OF 4	QUANTITY: 1	

FIGURE 3 – Details of fenced area.





NOTE: (1) MANUFACTURED FROM 18MM THICK MDF SHEET.

REV	DESCRIPTION	BY	DATE	APPVD
A	RELEASED FOR CONSTRUCTION	CW	13/01/15	CW
1	REVISED AS PER CLIENT COMMENTS	CW	13/01/15	CW

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TOLERANCES ARE 0.+- 2MM UNLESS STATED OTHERWISE.

MATERIAL:AS SPECIFIED

FINISH:AS SPECIFIED

THIRD ANGLE PROJECTION

DRAWN TO AS 1100

	NAME	SIGNATURE	DATE
DRAWN	M.CARR		13/01/15
CHK'D	C.WHEELER		13/01/15
APPV'D	C.WHEELER		13/01/15

TITLE: 2015 WARMAN COMPETITION TRACK COLLECTION TROUGH

A3

DWG NO: 001 | JOB NO: | REVISION: A | P/N:

SCALE:1:10 | SHEET 4 OF 4 | QUANTITY: 1

FIGURE 4 – Detailed view of "possible" collection trough.

FIGURE 5 – Elim variable height golf tees.

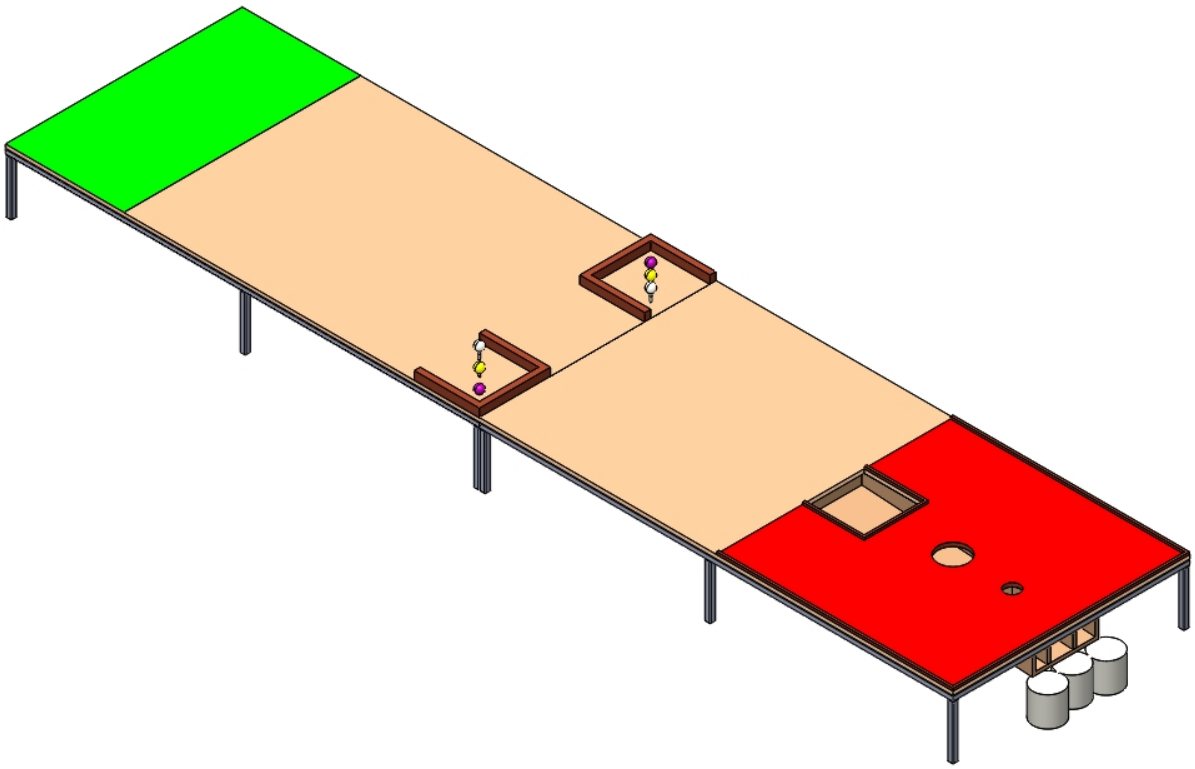
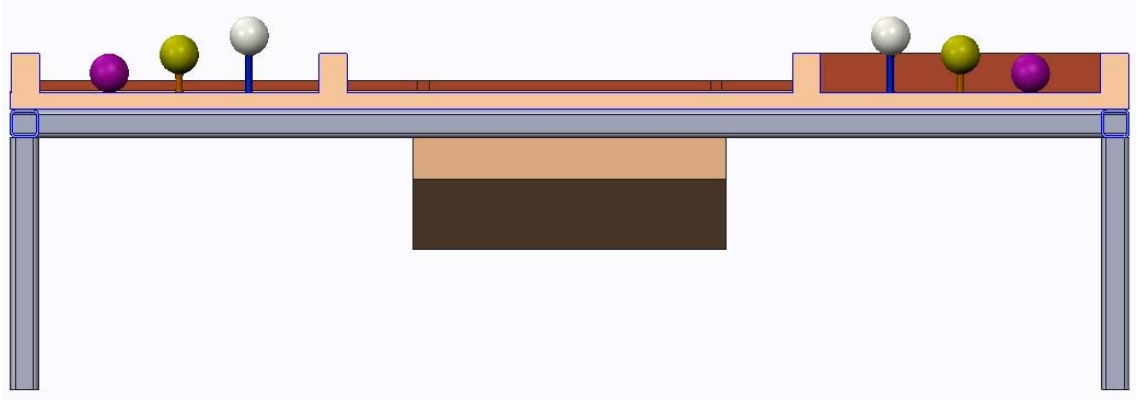


FIGURE 6 – Competition track showing starting position of golf balls and use of collection containers.

(a) Plan view showing reference positions of golf balls ie; i = 1 to 6.



(b) Cross-section view showing relative heights of golf balls.

FIGURE 7 – Reference positions and relative heights of golf balls.

PROTOTYPE SYSTEM

G 17. The system shall deliver the payload on the defined competition track in accordance with the rules.

G 18. The system shall represent a ground based solution for traversing the competition track and delivering the payload.

G 19. The system will be initially positioned in the Start Zone and be fully supported by the base plane of the competition track.

G 20. 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 21. 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 and may be disqualified.

G 22. 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 23. 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 system presented has 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 mass of the team’s system SHALL be measured by an official. The system mass (i.e. without payload) SHALL NOT be greater than 6 kilograms.

NOTE: *A maximum system mass of 6 kg has been selected to reflect new carry on allowances by Jetstar and Virgin airlines so as not to disadvantage interstate and international teams travelling to the National Finals that MAY wish to transport their system as carry on. Teams must appropriately satisfy the airlines restrictions/limitations for carry on and/or checked luggage.*

R 7. The team SHALL then be called to the track side.

R 8. Contact by team members or their system with the competition surface before setup commences is prohibited.

R 9. When ready an official will signal that the setup has commenced. The team SHALL be allowed a maximum of two minutes for setup. In this time they are to set up their system in the Start Zone.

R 10. During setup, the team MAY use additional objects not considered part of the “system” to assist with setup.

R 11. 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.

R 12. The Team SHALL indicate to the appropriate official when their setup is complete.

R 13. After setup, and prior to running, the system SHALL be subject to volume constraints. The system 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 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 14. After set up and prior to running, the system SHALL NOT be held or supported or contacted by anything other than the competition surface and must be ready to start. This prohibits team members from restraining by personal contact ready-to-release systems. Systems SHALL be capable of remaining in the set up condition indefinitely.

R 15. On instruction and by a signal from the "official starter" the run SHALL commence.

R 16. The run SHALL finish within 120 seconds. This will be judged by an official.

R 17. The system SHALL be started using a single action that does not impart motion or energy to the system.

R 18. After performing the single-action start of the system, team members SHALL NOT control or touch the system 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 system that is malfunctioning, a zero score for the run SHALL be recorded.

R 19. During the run the system SHALL NOT come into contact with anything below the competition base plane (defined in G8).

R 20. During the run, the system SHALL NOT by design, overhang the projected extremities of the Competition Track.

R 21. At the completion of the run, the system SHALL 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 system MAY continue to move but no further functions can be executed. The payload MAY continue to move.

R 22. 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 system ceases translation and all functions have ceased and the recorded time MAY exceed the team's declaration.

R 23. To ensure that judging has been completed teams SHALL NOT retrieve their system or assist in gathering other items until directed by an official.

R 24. The system SHALL NOT damage or contaminate the competition track. Teams presenting a system that damages 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 25. As directed, teams MAY attempt two runs.

R 26. 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 27. Violations of procedural rules SHALL result in a zero run score being recorded.

R 28. The judges' decisions on all matters pertaining to the competition SHALL be final.

SCORING

R 29. Better systems will achieve the objective of delivering the payload (ie; 6 golf balls) while adhering to the timing, volume and positioning constraints.

R 30. The run score is based on the following formula:

$$RUN\ SCORE = \sum_{i=1}^{6} BALL\_VAL(i) * [BALL\_CNTRL(i) + BALL\_DEL(i)]$$

Where:

i = 1 to 6; representing starting position of golf balls as detailed in Figure 7

BALL_VAL(i) = 10 if a white golf ball, ie; i = 1 or 2
= 15 if a yellow golf ball, ie; i = 3 or 4
= 25 if a pink golf ball, ie; i = 5 or 6

BALL_CNTRL(i)= 0.5 if ball from starting position "i" is removed from the fenced area, controlled and delivered to a storage pit
= 0.25 if ball from starting position "i" is removed from the fenced area and controlled
= 0 otherwise

BALL_DEL(i) = 0.5 if ball from starting position "i" is deposited in the Ø76 mm storage pit
= 0.45 if ball from starting position "i" is deposited in the Ø152 mm storage pit
= 0.4 if ball from starting position "i" is deposited in the □300 mm storage pit
= 0 otherwise

The following data shall also be recorded for each run:
RUNTIME = Time in seconds for complete run
MASS = Net mass of system in kilograms

R 31. For the payload to be considered “removed”, it SHALL be wholly outside the fenced area as observed by a plan view projection at the completion of the run.

R 32. For the payload to be considered “controlled” it SHALL be in contact with the system after removal from the Fenced Area up until the system reaches the Finish Zone.

R 33. For the payload to be successfully “deposited” in a Storage Pit the payload SHALL pass through the opening representing the Storage Pit and SHALL NOT be in contact with the system.

R 34. The RUNTIME for the run SHALL be measured as the time from the start command being given, to the system 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. The payload MAY continue to move.

R 35. Each team MAY attempt two runs. The Competition Score shall be the higher Score achieved from either run plus half the Score achieved from the other run. The highest Competition Score shall be declared the winner. The system 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 36. If equal Competition Scores are recorded by teams, teams tied SHALL be ranked based on the RUNTIME of their highest scoring run. Time will similarly define other minor placings as necessary.

R 37. For runs that result in one or more golf tees being removed from their original locating hole 2 points SHALL be deducted from the RUNSCORE per dislodged golf tee.

R 38. For runs that result in one or more golf tees being damaged to an extent requiring replacement 2 points SHALL be deducted from the RUNSCORE per damaged golf tee.

Frequently Asked Questions

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

Yes. The scenario is for a ground based system (see G18). The rules do define what can be legally contacted.

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

No. If the system, or part of the system, is discarded off the competition track this would lead to a zero run score (R19). Similarly, if a ball is lost from the competition track, the BALL_CNTRL component of the run score for that particular ball would be allocated a value of zero.

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 (see R21).

4. Autonomous – does this mean that the system on the 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 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 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 (see R18).

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 or similarly kitted systems are not allowed (see R3).

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.

8. Is there a requirement on the end state of the system at the completion of the run?

Yes, having satisfied R13 and R14 before the start, and R19 and R20 during the run, the system must satisfy R21 at the end. There are no other constraints on the system's track position.

9. Can the payload continue to move within the system after it has ceased both translation on the competition track and gross motion above the competition base plane as defined in R34?

Yes, the payload can continue to move within the system, however, this would be defined as a "function" of the system and the RUNTIME would continue until all the payload exits the system or is deemed to have become stationary in the system.

Further Competition Details

NATIONAL FINAL

It is planned that the Weir-Warman National Final will be held Friday 25 - Sunday 27 September 2015 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 2015. Depending on funding, it is hoped that Campus organisers will also be funded. Campuses will be billed for additional students and for other people for whom arrangements are made whether or not they actually attend the Warman weekend.

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.