Competition Rules

(Original Released: 25/2/2002)

Teams of up to four second-year mechanical engineering students may enter the competition. Resources on Gondwana are limited and so the students must manufacture their device themselves using commonly available materials and components.

The competition site will consist of two horizontal sheets of 2400x1200x19mm Medium Density Fibreboard (MDF) joined together, end to end, as shown in the attached figure. A 40mm thick mild steel annular disc will be fixed to the MDF sheet at the location shown. The steel disc will have an outer diameter of 180 mm and an inner diameter of 111.0-111.4mm. All surfaces of the MDF sheets will be brush coated with one coat of Wattyl Estapol Speed Clear followed by two coats of Wattyl Instant Estapol Matt. A black 3mm-wide line will be marked on the MDF sheet representing the starting line and the 800mm diameter perimeter of the "danger zone". A PVC drain pipe (100mm nominal diameter plain wall pipes to class SN6 of AS/NZS1260:1999) will be inserted into the steel disc and will be free standing on the MDF sheet.

The team will be handed a tennis ball (representing the fuel) and will then be allowed a maximum of two minutes to set up their device on the competition site.

Prior to its release, the device must be wholly contained within a 500 mm cubic envelope and be stationary behind the starting line. The device must not exceed a mass of 20 kg.

On instruction from the judges, the run will commence and must be completed within two minutes.

One team member will activate the device by a single action that does not assist the device in any way. No assistance may be given to the device at any time after commencement of the run.

During the run the device must not come into contact with anything other than the edges and top surface of the MDF base, any surface of the steel disc and any surface of the PVC pipe.

The time from commencement of the run until the tennis ball reaches the bottom of the PVC pipe will be recorded. This is the "delivery time", measured in seconds. An electronic sensor will be used to determine this time. (Campus Organisers may choose to vary the technique used for timing for their Campus Heats).

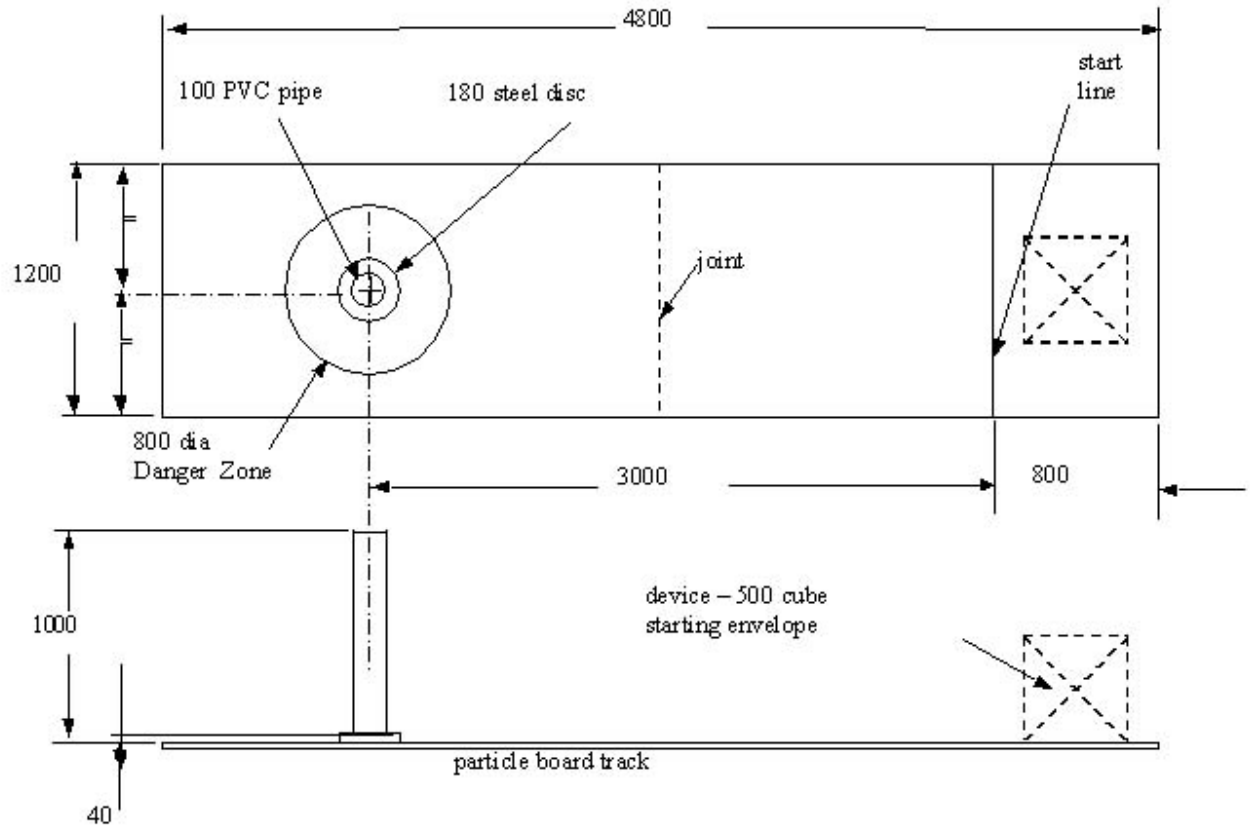
The device may continue moving after releasing the tennis ball up to the maximum allowable run time. This is to allow time for the device to move so that it is not in contact with the pipe or the "danger zone".

At the completion of a run, the tennis ball must have been successfully dropped into the PVC pipe and no part of the device may be touching the pipe or the MDF sheet within the "danger zone". The device must not fall off of the MDF sheet at any time. The PVC pipe must remain standing inside the steel disc. If these conditions are not met, the run will be deemed invalid and a "delivery time" of 120 s will be applied.

Each team will attempt two runs and the Warman Competition Score will be the sum of the "delivery time" for each these two runs. The lowest Warman Competition Score wins. The device may be modified between runs.

In the case of a tie for first place, there shall be repeated head-to-head runs between these teams until only one team remains. These repeated runs will be conducted at five minute intervals.

Devices that are deemed by the judges to be hazardous will not be permitted to run. In particular, devices using combustion or which damage the site are prohibited. The judges' decisions on all matters pertaining to the competition will be final.



NTS – units are mm

Judges Tips for next year:

The following tips have been provided by Allan Wightley, General Manager - Group Technology, Warman International Ltd. Allan has acted as a judge for many years for the Warman Student Design & Build Competition. The tips are provided to assist students and academic staff and, hopefully, will result in better designs and an overall better, more competitive, competition. More importantly, is hoped that the good ideas and concepts that are developed by students will have the best chance of success with the hope of a prize. The tips are as follows and are not in any particular order:

- Carefully, read, mark and learn the specification that is provided - every word means something.
- Ensure that your design and model meet the specification in full, both the letter of the word (in the specification) and anything that should reasonably be implied. For example, if the subject was to safely transport living beings, it would not be acceptable to have them all killed when the rescue device fell to the ground in a severe way.
- Ensure the model always gives reproducible results - test it several times.
- Consider the stability of the model in all likely conditions.
- Make the model transportable, so that when it is conveyed, usually by air to Sydney, it is not damaged in transit.
- Make sure that the model can be maintained or adjusted to give optimum performance.
- Understand the physical properties of the materials being used (elastic bands have a habit of stretching and losing their elasticity after two or three operations).
- Have a fall back function in your design should part of it not function correctly during the finals or the national competition.
- Demonstrate your inventive aspects of the design - often an award for innovation is made even if it otherwise fails.
- Consider first the functionality aspects and second, simplicity and elegance of the design - simple designs are invariably the most successful.
- Prior to starting the design, list all assumptions made (surface finish, damage to the surface, etc) this will help you to ask the right questions.
- Check the assumptions against the rules in the specification - if not absolutely clear get written confirmation and acceptance from the organisers.
- Each group must individually examine critically the specification and the rules. Do not rely on local campus staff to make interpretations.
- Keep the design concepts and features secret until the campus competition and from other National Finalists until the practice sessions start.
- Make sketches of the design and its elements and the rough position of the centre of gravity and predict how the elements will behave in motion.
- Remember the judges only have the actual performance on the day. They have no knowledge of the history or the background of the design or what assumptions people made at a local campus level.
- Sometimes there is an award for potential for improvement, make sure your design clearly demonstrates a potential for improvement and innovation.

- The judges invariably are experienced design personnel and instinctively favour designs that are elegant, simple and aesthetically pleasing. Therefore take some time in preparing a model that meets these requirements and looks well constructed. For example, small fasteners, or adhesives, always impress more and perform consistently better than sticky tape and elastic bands.
- Many designs falter during the set up stage because enough thought hasn't gone into simplifying or eliminating the set up stage. This can be done by building into the design means to accurately align and/or stabilise the model before it is placed on the set up table.
- There is considerable pressure on teams at the National play-offs.
- Many teams forget a vital adjustment or setting; prepare a checklist for your devise (like a countdown).
- Any team that breaks the start is automatically disqualified for the run, even though this is an operator error.
- Keep a supply of vital spare parts.
- Consider ways to improve performance – many teams win on the second run result.
- Allocate individual team members separate tasks which they always perform so that there is maximum efficiency during set-up and will give more reproducibility of results.
- You will receive far greater satisfaction and achieve a better learning experience if you and your team develop most of the design concepts and make the components yourself. Do not ask academic staff, other students, or people not connected with the University, to produce the design for you. Even if you win a prize, there will be little, if any, satisfaction and no learning experience. However, that does not preclude you having academic staff or experienced practitioners review the design and pass comment provided the work is substantially done by the students.
- For those lucky enough to attend the national final, study the other entries, how they approached the problem, look for shortcomings and look for good design features and methods of construction, you will learn a lot - even the judges do.
- Be competitive in your entire approach to the project and take the exercise seriously, but always ensure that it is fun to do.

Note: It is recommended that students put the name of their university on their model.

I trust that the above tips may be useful in your project and will result in a better competition.

Regards

Allan Wightley