



Institute of Industrial Arts Technology Education
Future Designers & Engineers

NSW Aeronautical Velocity Challenge 2017

It's NOT Rocket Science!

Rules and Regulations - Bottle Rocket

Teams

Teams may consist of a maximum of FOUR members.

There is no age restriction in the competition and it is open to teams of students from any year group(s) K-12.

Mixed gender teams are encouraged.

Tools, Construction Materials and Resources

Each team will be responsible for supplying their own materials, cutting mats, tools and personal protective equipment for the competition. WHS instruction and training is required to be completed and is the responsibility of each school.

'Excite and Educate' will provide teams with nozzles for use in the competition.

During State Finals, rocket launching equipment will be supplied by the University of Wollongong, industry partners and local schools.

During Regional Finals, the use of rocket launching equipment will be coordinated by the regional coordinator or coordinating team. It is helpful for the schools involved to assist in the provision of equipment.

Teams are not limited by the type of materials used to construct fins, nose cones or additional components. The only limitation at this stage of the competition is the teams' creativity, innovation and imagination. However, sharp edges on fins, nose cone or any other component of the rockets are strictly prohibited. If sharp edges exist, the panel of judges may deem a disqualification from a heat necessary. Relevant alterations will be required to continue in the event. All materials must be judged to be safe for use in bottle rocket manufacture. Any queries regarding the use of materials should be directed to one of the competition coordinating committee for clarification prior to the event.

All construction must occur on the day of the event.

The use of pre-constructed templates, stickers or jigs are permitted to be used during the competition.

If digital technologies are used to create nose cones and fins then image /video evidence, clearly showing student work and manufacturing. This material must be provided to the AVC competition co-ordinator on the day of the competition (heat, regional, or state event).

Competition Structure

Competition will be divided into three divisions:

Primary

Junior (7-9)

Senior (10-12)

Competition comprises of 2 elements.

The winning team will be the team whose model/s accrue the highest overall score after all rounds have been contested. Marking guidelines will be published to registered schools upon receipt of nominations.

Element 1 Distance Challenge

Element 2 Aesthetic Assessment

Element 1) Distance Challenge

The winner of the distance challenge will be based on a round robin format with winners progressing through to the finals rounds. Teams will have 2 launches each round with the winning distance based on the maximum distance reached out of the two launches. Distance achieved will be based upon the furthest distance from the initial launch zone, allowing for rockets to 'bounce' upon impact. Therefore the distance will be judged once the rocket has come to rest.

Element 2) Aesthetic Assessment

The aesthetic design assessment will be conducted throughout the day by the selected panel of experts and will be judged based on the teams' application of graphics, colour, creativity, innovation and imagination. The team's name must be visible on at least one of the component surfaces.

Full marking guidelines will be published to registered teams upon confirmation of entry.

Other Rules and Regulations

- 1) PPE MUST be provided by each individual school team and all relevant workplace health and safety training and demonstration MUST have occurred prior to engagement in heat, regional or state final competitions. The onus and expectation is on the individual school to ensure all workplace health and safety requirements and expectations have been addressed as per relevant departmental policy. During school heats, regional and/or state final events, students MUST follow all workplace health and safety instructions communicated by the coordinating teachers and industry experts.
- 2) Only 1.25 or 2 litre carbonated soft drink bottles (CSD) may used in the construction of the pressure chamber component of the bottle rocket. Schools should avoid the newer thin walled bottle construction due to potential failure at launch.

3) 'Ring fins' not directly attached to the pressure chamber are not permitted in the primary and junior division 2017.

4) 'Ring fin' designs are permitted in the senior division in 2017.

5) Teams are encouraged to record and share their processes throughout the day through the use of photographic, video and audio devices. Each team may wish to allocate the role of 'media manager' to one member of their team.

Judging

All decisions in relation to the interpretation of regulations, the disqualification of models or teams, the appointment of heat winners, inspection of models and all similar questions will be referred to an independent scrutineer. Where possible the scrutineer will be supplied by the industry partners and supporting organisations.

Regional co-ordinator will facilitate communication channels between competing schools for semi finals. Where schools fall out of the catchment area of the regional hub, two schools can compete with principal verification of data. At the discretion of the regional co-ordinator validated data will be used to compare with regional results at the hub competition.

Schedule of events at Hub Semi Finals and State Finals

Morning

Teams will have 45 minutes to construct their bottle rocket(s).

Rockets must be named for identification at the time of registration and carry that name clearly marked during the competition.

When construction time is called ALL teams will be required to assemble at the designated launch area.

Participants must remain in the designated launch area to observe all competition launches.

Teams will be called in random order by the scrutineer or scrutineering team.

Teams which are not ready to present a model for launching when they are called will automatically record a 0 for that launch. .

Once all round heats have been launched a 30 minute pit time will be called during which teams can rebuild, repair and/or modify their models.

At the end of the pit time teams will be required to reassemble at the designated launch area for the following round. The State Finals will include 3 rounds of competition.

Lunch

Teams will have 15 minutes to repair/rebuild in preparation for the final.

The round-robin draw will be established by the scrutineer.

Qualification for State Finals:

Teams will compete across the 12 Regions in NSW.

The best teams plus wild card nominations will be invited to compete in the State Finals.

Selection of these teams will be based on their results of the regional competitions. Allocation of places for the State Finals will be made by the governing AVC body and will be communicated to qualifying schools no later than two weeks prior to the State Final competition date.

At the conclusion of regional competitions scrutineers will communicate the Top 3 recorded scores to the governing AVC body as the basis for selection into the State Finals.

Wild Card entry will be offered by invitation only from the AVC body.

All decisions made by the AVC body are final.

Rules and Regulations - PLANES

Teams

Max 4 persons for State Finals AVC Competition

Tools, Construction Materials and Resources

Each team will be responsible for supplying their own materials, tools and personal protective equipment for the competition. Safety glasses must be worn for the flight activity.

1 x motor 12 Volt

1 x propeller

2 x wheels

1 x axle

Balsa or alternate materials

Specifications for materials to match the standard components supplied by Designability

Glues - Hot glue gun only

Flying the competition

Flight will be achieved by tethering model aircraft to a central power-post/power-anchor around which they will orbit.

Model aircraft are to be capable of sustained flight. Once they have achieved take-off they must be able to stay airborne until their time, height or combat heat is completed.

Rules for flight

Model aircraft must fly **clockwise** around the power-anchors.

Any model which is presented for competition and rigged to fly in the wrong direction will automatically score 0 and will not be allowed to compete. If an opponent team presents a model which successfully flies in the correct direction it will automatically score the winning 3 points.

Models must take-off under their own power using wheels. Models cannot be hand-launched.

Models cannot be modified or repaired once they are outside of the construction zone and/or have been presented for competition on the flight-line.

Teams which are not ready to present a model for competition when their heat is called will automatically score 0 points and their competitor will be judged the winner of the heat.

Combat flight

In each heat two model aircraft will compete against each other at the same time while attached to opposite sides of the power anchor.

A model which alights upon the ground as a pilot-controlled tactic during combat will be deemed to be capable of sustained flight.

Competition Structure

Competition will be divided into two divisions:

Novice Up to Year 9

Professional 10 to 12

The competition will comprise 3 rounds.

Teams are allowed to build 2 separate planes, one for height and one for speed

The winning team will be the team whose model/s accrue the highest overall score after all rounds have been contested.

Round 1	Height challenge
Round 2	Speed challenge
Round 3	Combat challenge

Special prizes for aesthetics will be awarded

Height challenge

Initial build time is 45min.

Teams are encouraged to bring templates to assist in building their solutions.

Flight heights will be measured on the average of 10 laps after 2 laps of acceleration.

Flight heights will be measured each lap as the models pass a set reference point.

For models with unstable flight profiles the average of the highest and the lowest flying heights will be recorded as the official flight-height for that flight.

Speed challenge

Model speeds will be calculated on the average of 10 laps after 2 initial laps for acceleration.

The official scrutineer and/or their representative will do the time keeping.

Lap times will all be flown on the same power-anchor

Once all first flights have been flown, 30 minutes rebuild and modification time will be allowed, during which teams can work on their models.

At the end of the rework time teams will be required to repeat the draw.

Top speeds will be judged by taking the better of the two results.

Combat challenge

The purpose of combat is to force the opponent's aircraft out of the air and/or to damage it in a manner which prevents it from continuing to fly. This is a knock out round.

The winner of each heat will score 3 points.

A team which enters a model which taxis around a full lap of the circuit but fails to become airborne will score 1 point.

Winner: After the physical impact of combat the winner will be -

In the case of damage

- the plane which can take-off and fly again
- If neither can take-off and fly – then the aircraft which is considered by the independent judge to have been the aggressor in the combat.
- the progressing team will have a 10 minute repair time before the next round

In the case of no collision or both are flyable

- If both remain flyable - then the aircraft which is considered by the scrutineer to have been the aggressor in the combat will be deemed the winner.

Combat flights will fly for a maximum of ten laps, at which time direct combat must be engaged or a decision to continue or restart will be made by the scrutineer.

If the scrutineer judges that the aircraft are too similar in performance for combat to be successful, then the competition will be judged to be a tie.

In the case of no contact during elimination heats, neither will be the winner but both will progress to further elimination heats.

The overall winner will be calculated on the basis of accumulated combat points at the end of all round-robin heats.

At the end of each heat teams will have a maximum of 5 minutes to make emergency repairs to their model in order to compete in the next heat.

Schedule of events

Morning

Teams will have 45 minutes to construct their aircraft.

Planes must be named for identification at the time of registration and carry that name clearly marked on a wing during the competition.

At the end of building time teams will have to nominate their plane/s for either or both speed and height competitions.

During construction and rebuild times the power anchors will be available for test flights

At the end of building time speed and height laps will be flown on adjacent power-anchors. Speed and Height competitions will be run simultaneously.

When time is called ALL teams will be required to assemble in the flight hall.

Once flights start no members of any team or their support crew will be allowed to re-enter the

construction hall or repair a model for any reason.

Participants must remain in the flight hall to observe all competition flights

Teams will be called in random order by the scrutineer.

Teams which are not ready to present a model for competition when they are called will automatically record a 0 time or height for that flight.

A team may be excused from the above regulation only if the model concerned is flying on the adjacent power-anchor at the time it is called to compete.

Once all first round heats have been flown a 30 minute pit time will be called during which teams can rebuild, repair and/or modify their models.

At the end of the pit time teams will have be required to repeat the draw.

Best results and the winners will be calculated at the end of the second round.

Lunch

Afternoon

Teams will have 15 minutes to repair/rebuild or prepare their aircraft for combat.

The round-robin draw will be established by the scrutineer.

Combat Challenge

Demonstration Challenge

Scrutineering and awarding of prizes

Definitions

Flight

Aircraft will only be judged as having achieved flight if it leaves the ground under its own power and does not alight back on the ground unless as the result of collision or unpredicted/unexpected outside forced (to be judged by the official observer).

Aircraft which do not achieve sustained flight (as above) will be disqualified from combat, height and speed competitions.

Acceptable modifications

Only the standard construction materials are allowed, but any modification to those materials is allowed so long as no additional or different materials are used.

Judging

All decisions in relation to the interpretation of regulations, the disqualification of models or teams, the appointment of heat winners, inspection of models and all similar questions will be referred to an independent scrutineer. Where possible the scrutineer will be supplied by the supporting organisations.

Qualification for State Finals:

Teams will compete across the 12 Regions in NSW.

The best teams plus wild card nominations will be invited to compete in the State Finals.

Selection of these teams will be based on their results of the regional competitions. Allocation of places for the State Finals will be made by the governing AVC body and will be communicated to qualifying schools no later than two weeks prior to the State Final competition date.

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